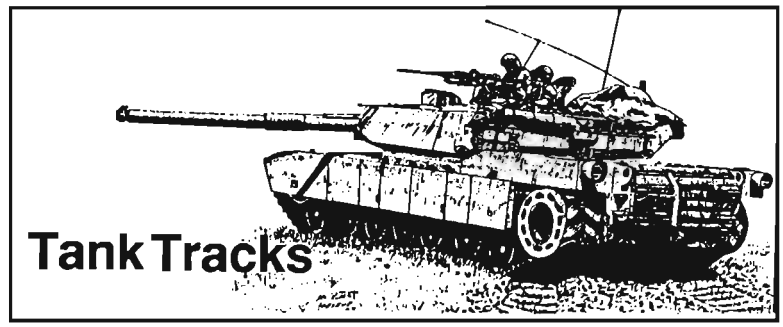
ARMOR

A SQUADRON AT WAR, *page 8*

PB 17-19-4 *This publication approved for public release, distribution is unlimited.* *July-August 1991*



The Battle of 73 Easting seems to be becoming one of the centerpieces of the armor vs. armor battle in Iraq. Last issue we highlighted Ghost Troop's role, and now we provide you the story of the whole 2d Squadron, 2d Armored Cavalry in its campaign to liberate Kuwait. 1LT John Hillen's unemotional narrative provides many lessons, particularly in flexibility to handle shifting and varied missions.

The recent Pentagon report to Congress on fallout from DESERT STORM cited the heavy equipment transporter problem. Some 1200 were required, and only 500 were available. COL Mac Johnson and LTC Tom Rozman explore the problem of insufficient HETS and the missed training opportunities their lack denies our heavy forces. The authors offer a training strategy to fill the gap.

COL Dale Stewart's account of his visit to an East German T-72 regiment will either dash or confirm your preconceptions on the readiness of units we faced across the Iron Curtain. Compare living conditions with ours in Europe and contrast the readiness and capabilities with what we have come to associate with the similarly-equipped Iraqi battalions.

Much of our gunnery training focuses on the TC and gunner, while the loader is off accomplishing other tasks. SFC Capobianco has contributed an important piece on how to train your loader — an all-too-often neglected member of the tank crew.

Live-fire training exercises serve as the most perfect test of crew and unit maneuver and gunnery skills short of actual combat. However, rarely does a platoon have the opportunity to execute a live-fire exercise on its own rather than as part of a company/team. MAJ Tim Edinger outlines a plan to set up and execute a platoon live-fire exercise, no simple task, but an exercise that reaps huge training benefits.

Another citation of the Pentagon report to Congress on Operation DESERT STORM was our lack of preparedness in coping with a potential chemical threat, both in equipment and in training. Based on NTC observations, CPT Robert Neumann gives us a step-by-step method for a unit, such as a scout platoon, to find and bypass a contaminated area quickly. Skilled in this drill, a unit can increase its chances of survivability as well as enhance its speed and efficiency in mission accomplishment.

CPT Jeffrey Wiltse offers his solution to a problem that has been with armies as long as they have existed, yet has drawn heavy attention because of the comparatively low casualties in the Gulf War — fratricide. Attacked as a training problem, units can reduce their chances of taking and inflicting friendly fire casualties.

Finally, I again call upon all of you to write for ARMOR. Your DESERT STORM, DESERT STORM support, NTC, and other experiences and thoughts are of interest to all of our readers. Help us spread the word, the lessons, and the ideas.

— PJC

By Order of the Secretary of the Army:
GORDON R. SULLIVAN
General, United States Army
Chief of Staff

Official:
PATRICIA P. HICKERSON
Brigadier General, United States Army
The Adjutant General

ARMOR

The Professional Development Bulletin of the Armor Branch PB-17-91-4

ARMOR (ISSN 0004-2420) is published bimonthly by the U.S. Army Armor Center, 4401 Vine Grove Road, Fort Knox, KY 40121.

July-August 1991, Vol. C No. 4

Features

Departments

Second-class official mail postage paid at Fort Knox, KY, and additional mailing offices. Postmaster: Send address changes to Editor, ARMOR, ATTN: ATSB-AM, Fort Knox, KY 40121-5210.

Distribution Restriction: Approved for public release; distribution is unlimited.

USPS 467-970

LETTERS

Education is Key to Success

Dear Sir:

What if NCOES for the Armor/Cavalry went away? Where would our NCOs rank with their peers of other branches? Where would the Armored Force be? As I read the March-April Driver's Seat, these questions haunted me.

CSM Fryer addresses the issue of stabilized crews as the answer to the Armored Force's training problem. I would agree that stabilizing crews does enhance our training program, however, I do not feel that by stopping an NCO or potential NCO from going to BNCOC or PLDC, because of an upcoming ARTEP or gunnery, is the solution to the problem. The senior leadership of the Armored Force has seen the importance of leader development and emphasized it down through the chain of command. We, who are responsible for the management of NCOES, must ensure that we understand the commander's training focus to minimize turmoil. If we start preventing this NCO from attending school for these reasons, we will come up with other reasons as well — this is the thinking of ten years ago.

The divisional cavalry squadron to which I'm assigned was alerted for Southwest Asia the second week of November 1990. The decision was made to form an additional cavalry troop. The members of this troop came from various units, to include a large number from OSUT. The NCOs and officers were selected from the division or were replacements to the division. Crew stabilization was not the answer, even though we tried to maintain stability. The answer to the problem was, and is, quality individual and collective training emphasizing drills. This new troop performed well because they stuck to the basics and used the drills they had been taught. This unit was not hand-picked; however, it had highly motivated, disciplined, and trained soldiers. The key to success of our force is education. We

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ARTICLE SUBMISSIONS: To improve speed and accuracy in editing, manuscripts should be originals or clear copies, either typed or printed out double-spaced in near-letter-quality printer mode. We also accept stories on 5-1/4" floppy disks in MultiMate, WordStar, Microsoft WORD, WordPerfect, XyWrite, Xerox Writer, and ASCII (please include a double-spaced printout). Please tape captions to any illustrations submitted.

PAID SUBSCRIPTIONS: Report delivery problems or changes of address to Ms. Connie Bright, circulation manager, (502)942-8624.

UNIT DISTRIBUTION: Report delivery problems or changes of address to Ms. Mary Hager, DSN 464-2610; commercial: (502)624-2610. Requests to be added to the free distribution list should be in the form of a letter to the Editor-in-Chief.

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must ensure that our leaders go to school if the Armored Force wants to continue to lead the Army in quality leaders. We must look forward and continue to push individual skills and standardized drills. We cannot afford to step back into the past. We must continue to educate.

ROBERT M. COBB
Command Sergeant Major
1st Sqdn, 4th Cavalry
1st Inf Div (Mech)
Ft. Riley, Kan.

Best Selling Point of GPS Omitted

Dear Sir:

After reading Captain David Howard's "Knowing Where You Are" (*ARMOR*, March-April 1991), I was concerned that the best selling points of the Global Positioning System (GPS) had not been mentioned. The article was well written and informative, but did not specifically address the combined arms benefits that will be gained, especially in accurately reporting the location of emplaced obstacles.

The GPS will save many lives and a lot of equipment because the position of units, terrain, and yes, obstacles can be accurately plotted, placed, and reported in a timely manner. The GPS system allows soldiers to find their location without relying upon individual ability (or lack thereof) to read a map. It can be difficult to correlate a graphic representation (contour lines) with actual terrain features. This high-tech capability is a quantum improvement over previous systems.

While terrain features can be significant obstacles, the fact that emplaced obstacles, such as minefields, tank ditches, etc., can be accurately reported to many units translates into hours of saved engineer effort and maneuver force travel time. I cannot remember how many times I have seen at NTC, or heard from compatriots, that a minefield had to be rebreached because the cleared lane was not immediately evident nor accurately reported. This is especially true in a desert scenario.

The minefields encountered in the Persian Gulf War were flawed. The allied forces were able to cross or go around emplaced obstacles with relative ease. This is what today's soldier has experienced. This may not be the case in the future. Only by practicing with GPS to develop the emerging doctrine can the true potential of this emerging technology be maximized.

JAMES A. GLASS
CPT, EN
Chief of Collective Training
US Army Engineer School
Ft. Leonard Wood, Mo.

Clarifications to 4th AD Article

Dear Sir:

As a former tank platoon leader with the 4th Armored Division 1964-66, and author of some research on the 4th AD in World War II in *ARMOR* ("Breakthrough to Bastogne," Nov-Dec 1981, and "Return to Singling," Sep-Oct 1985), I was gratified to see the 4th Armored commemorated in "Speed and Power" in the March-April 1991 issue. There are some clarifications that might be made, however.

The 4th did not capture the German U-boat base at Lorient in August 1944. The 4th did lead Patton's breakout through Avranches and with the 6th Armored drove into Brittany to capture Lorient and Brest respectively. But both ports were fortified, and repulsed the armored attacks. Brest was only taken a month later, by elements of three divisions, and the Germans held Lorient until the end of the war. General Wood indeed felt that the decisive maneuver should be eastward, not back into Brittany, and most analysts have subsequently agreed.

In its drive to relieve Bastogne in December 1944, the 4th Armored did not link up with the 10th Armored. The 4th made its end run from the left flank of Millikin's III Corps. 10th Armored was with Eddy's XII Corps farther east, and its CCB was in Bastogne itself.

For military historians, there is no longer any mystery about Patton's relief of General John S. Wood. As General Albin Irzyk and Hanson Baldwin's *Tiger Jack* indicate, the November 1944 offensive exhausted and frustrated both Wood and his division. In particular, Wood's schemes of maneuver had been repeatedly overruled by the XII Corps commander, General Manton Eddy, who had come from 9th Infantry Division, and who really did not comprehend mobile warfare concepts. The final confrontation occurred on December 1st at the CCA command post in the Mackwiller railroad station, after Wood had privately negotiated a flanking maneuver through Seventh Army's zone, but whose advance had then collided with Panzer Lehr Division's counterattack. Details from diaries and from correspondence with many of those involved may be found in my "Patton's Relief of General Wood," *Journal of Military History* (July 1989), published by the Virginia Military Institute.

The armor community should be familiar with the factual history of one of the best of America's armored units, and with the abilities and the fate of Patton's favorite division commander.

A. HARDING GANZ
History Dept.
Ohio State University
Newark, Ohio

Harmon Also Commanded 3d AD During WWII

Dear Sir:

Delighted to receive my copy of *ARMOR* for March-April 1991 and read the extensive article on Major General Maurice Rose.

I noted that Dr. Greene used some of my previous material that I had published in both the 2d AD Association bulletin and the 3d AD newsletter, and I appreciate the credit rendered in his references.

The following article on the history of the 3d Armored Division omitted a significant mention of one other division commander of the 3d AD during World War II. This happens to be none other than Major General Ernest E. Harmon.

In Harmon's *Autobiography of a Soldier, Combat Commander*, by Major General Ernest E. Harmon, USA (Ret.), and Milton MacKaye and William Ross MacKaye, on page 252, Harmon is quoted:

"The morning after Rose was killed, Bradley telephoned and asked me to step down from my corps (XXII) assignment (CG) to take command of the Third Armored. I accepted the change of orders without hesitation; the combat situation seemed to demand it. However, when I arrived at the Third Armored headquarters and looked things over, I found that the officer who had been assistant division commander, Brigadier General

Doyle O. Hickey, had everything well in hand. I notified Bradley that the Third Armored's command structure was in better shape than he had supposed, and I recommended that Hickey, an extremely competent general, be given the command.

"Two days later my recommendation was approved, and I went back to XXII Corps. As a result of the two-day sojourn, however, I can claim — for those who enjoy odd facts — that during World War II, I commanded the First, Second, and Third Armored Divisions."

As an old admirer of Harmon, I have no doubt of what and how it happened, that he did command all three big armored divisions. Interesting to note that Bradley bypassed the corps command to go directly to Harmon, which is another story within itself.

DON R. MARSH
Technical Sergeant, Ret.
Tustin, Calif.

Co/Tm Commander Should Use S2's Input

Dear Sir:

CPT John Scudder's article, "Planning the Deliberate Attack" (March-April 1991 issue), is one of the most clear and concise articles I have ever read. It is a good "step-by-step" approach for any combat arms commander.

I do, however, take exception to his statement that "many company/team leaders totally accept the task force S2's Intelligence Analysis" and "this can be a dangerous practice because many S2s neglect essential information." What I hope that CPT Scudder really meant is that each company/team commander should do his own commander's preparation of the battlefield in addition to using the S2's input.

The S2's focus sometimes lacks enough detail for company commanders and platoon leaders, but is more than adequate in its focus to support and enable the battalion commander and staff to make the appropriate decisions. The team commander should not be his own intelligence officer, but should augment the S2's input with much more detail, using situation templates, leader's recons, and eyes on the ground. Team commanders need to think like the enemy company or battalion commander he is going to face. And his focus is not just on the immediate battle, but for the follow-on mission, whether it is defending or continuing the attack.

CPT Scudder will be an outstanding commander, but at no time should he discount or dismiss his S2's input. To do so results in defeat, as he has witnessed at the NTC.

MAJ MARK LOPSHIRE
Battalion XO
107th MI Battalion (Light)
7th Inf Div (Light)
Ft. Ord, Calif.

Tank Destroyer Recollections

Dear Sir:

As a former member of the tank destroyers, I thoroughly enjoyed 1LT Nagl's excellent article, "Tank Destroyers in WWII," which appeared in the January-February 1991 issue of *ARMOR*.

I served in the 628th Tank Destroyer Battalion, which was attached to the 5th Armored Division in WWII. We started in Normandy, helped close the Falaise Gap, assisted in the liberation of Paris, took the prince of Luxemburg home, then were the first American unit to breach the Siegfried Line and enter Germany, at Wallendorf on 11 September 1944. We then were the first armored unit to fight in the Huertgen Forest battle. At war's end, we were on the Elbe River as the closest U.S. unit to Berlin.

My unit started the war in the M10 tank destroyer with a naval 3-inch gun, and later we were issued the M36 with the 90-mm gun. We added a folding steel top to deflect airbursts.

Our role, probably because we were attached to an armored division, generally followed the prescribed doctrine for tank destroyers, although we were still assigned many missions normally given to tanks merely because there were no more tanks available, and we looked like one.

I second Lieutenant Nagl's closing paragraph, that tank destroyers serve as models for development and employment of future light armored systems. Then the sacrifices of those of us who served will again be repaid.

It's too bad the distinctive eye-catching patch of a tiger with a tank in its mouth hasn't yet been resurrected. I wore it proudly on my right shoulder during my 25 years service in armor and cav units. May it and our great motto, "Seek, Strike, and Destroy," someday fly again.

ROBERT W. HERMAN
LTC, Armor, Ret.
Peoria, Ariz.

More on Tank Destroyers

Dear Sir:

The article, "Tank Destroyers in WWII," in the Jenuary-Februery issue of *ARMOR* was most interesting. I served with the 823d Tank Destroyer Bettalion, attached to the 30th Infantry Division, in its five campaigns in Europe, from Normandy to the Elbe River. Our battalion knocked out 124 enemy tanks and self-propelled guns, more than any other TD battalion in the ETO.

However, I have a problem with a couple of the statements in the article. The first states "...the battalion commanders called tank destroyers forward from their traditional position in the rear." To the best of my knowledge, the TD's traditional position was on or very near the FEBA. The second reads "Half of the TD battelions were equipped with the towed M5 three-inch gun in 1943, but the poor performance of the towed gun in offensive operations led to its early demise." Its demise was not early enough. Our battalion was converted from towed to self-propelled (M10), on paper at least, effective 18 December 1944. When we departed the area north of Aachen for the Ardennes on 17 December, we were halfway into our conversion, with 18 M10s and 18 towed guns. (Two or three of the towed guns, incidentally, were German 75-mm PAK 40s.)

Equipping TD units with the towed gun was a mistake. The weapon weighed 5,340 pounds. Once unlimbered from its halftrack, it was very difficult to manhandle into firing position. The crew had next to no protection from any kind of fire while serving the piece. When a gun position was overrun, the soldiers had the choice of trying to escape and evade, or surrender. When the battle of Mortain ended on 12 August, our battalion had 101 officers and men MIA and had lost 11 three-inch guns. Some of the missing were recovered and some spent the rest of the war in POW camps.

T. L. RANEY
COL, USA, Ret.
Fairfax Station, Va.

Master Gunners: Too Valuable to Promote?

Dear Sir:

In a memorandum for the Commander, U.S. Army Armor Center, dated 31 July 1990, subject, "Review and Analysis of CMF 19," the last sentence of paragraph 1, "Utilization and Assignments," states, "Being a master gunner is great, but it is not a substitute for solid platoon sergeant time."

I have spent five of my six years as a sergeant first class as a battalion or squadron master gunner. I know how difficult it is to find high quality, motivated, and intelligent staff sergeants or promotable sergeants who meet the requirements and who are willing to volunteer for master gunner school. Many times I have had to turn allocations back because we could not identify soldiers who met eligibility requirements and who were willing to volunteer.

Of those who do successfully complete the course, only a few have the dedication, initiative and high standards to continue on and become outstanding master gunners. From this relatively small pool of superior NCOs, the Army's battalions, brigades, and divisions draw their master gunners. It is these soldiers whom the current system rewards by not promoting beyond sergeant first class, even though the position is a master sergeant position at battalion and a sergeant major position at division.

I have a GT score of 135, a CO score of 150, I am fully trained in two MOSs and five ASIs. I have 41 semester hours of college, I have graduated from nine military schools, three of them, to include ANCOC, as an honor graduate. I have never received punishment for anything and never received a bad NCOER. I point all of this out to emphasize that I meet all criteria for promotion to master sergeant except three years of platoon sergeant time.

During my tours as both a squadron and battalion master gunner I have received every type of an award possible short of the "Legion of Merit," to include the Armor Association's "Bronze Medallion of Saint George." Beyond that, I have seen poor or mediocre units steadily improve, under my tutelage, until they were the best trained and highest performers in the division or regiment. It is precisely because I have been successful that I have remained as battalion/squadron master gunner. When I ask about becoming a platoon sergeant, I am told "You are too valuable to lose."

The Department of the Army needs to take a close look at the injustices being done to 19 CMF master gunners. Numerous steps could be taken. For example, the ASI could be permanently pulled after an individual has served three years as a master gunner, or commanders could be required not to use a sergeant first class as master gunner unless he has completed three years rated time as platoon sergeant. There has been discussion, in previous years, concerning making master gunner ASI a warrant officer career field. This too would be worthy of consideration, however, I am not in favor of everyone who carries the master gunner ASI being eligible to make that transition. The recommendation for a master gunner to make that transition would be approved by no less than a colonel commander. This would ensure that only the highest caliber master gunner is afforded that opportunity.

As it now stands, master gunners are caught in the middle, and until those injustices are corrected, I am compelled to discourage outstanding soldiers from becoming master gunners.

HARRY L. WELLS
Battalion Master Gunner
1-70 Armor
Ft. Polk, La.

Hi-Tech Reinvention of the Wheel

At the 1991 Armor Conference, I sat in the Skidgel Hall Conference Room and listened to an After Action Review of gunnery-related issues of Desert Storm. As I listened to some of the best master gunner minds in the armed forces, I heard some thought-provoking issues. I also heard some problems that had simple corrections and quick fixes. I will not bore the reader with the long history of vehicles produced with exposed weapons, only to rediscover, through loss of life, that the enemy shoots back. There is a long list of vehicles that were field modified to offer protection to the user of those exposed weapons, two of which are still in service, the M551 Sheridan and the M113 ACAV. When the loader on an M1-series tank uses his loader's 7.62-mm machine gun to protect his tank from enemy light-fighters, he is in great danger from small arms fire. Let's also skip the doctrinal debate and accept the fact that hostile troops have many opportunities for close-in fighting with unbuttoned tanks.

So how do we protect America's sons from harm's way? I would simply be reinventing the wheel if my solution was to place an armored plate in front of the machine gun. The Russians' fight in Afghanistan relearned the lesson, and lo and behold, T-80s and T-72s have "chicken-plates" (a little Vietnam-era deja vu). America is the leader in the use of high technology on the battlefield. The key element here is acquisition. What would make the '90's version hi-tech is use of a clear substance like Alon or Kevlar. A small battery-operated reticle projector would give you quick acquisition and accurate fire, by using a heads-up display projected reticle.

By implementing this product improvement to the M1-series tank, we can provide protection to the loader without loss of target acquisition because his protection is of a clear substance. There should be one more consideration, and that is lasers and directed energy weapons. A tank is a hunted beast, and detection is immediately followed by target designators and range finding equipment. It would be a sad state of affairs when an M1 tank loader was protected from the small arms fire only to be blinded by the target designator. So, our hi-tech gun shield will have to have a laser filter coating.

Let's forge the thunderbolt by maintaining our edge to apply the technology and the lessons learned in one swift strike.

MSG JOHN BITTAY
U.S. Army Readiness Group Pittsburgh
Oakdale, Pa.

War Revives Armor Badge Issue

Dear Sir:

The resounding victory in the recent Gulf War validated to friend and foe alike the soundness of our Combined Arms Doctrine. More important, the necessity of heavy armor to that doctrine was clearly demonstrated. One might even go so far as to say that Armor was the keystone to the ground war victory. Accepting this fact as true, one question pops to mind; why is the importance of Armor, as a decisive combat element, not recognized with a combat qualification badge?

The argument over establishing a Combat Tanker's Badge has raged for several decades within the Army. The supremacy of the Combat Infantryman's

Continued on Page 49

MG Thomas C. Foley
Commanding General
U.S. Army Armor Center

Developing Armor Leaders: Now and in the Future

Operation DESERT STORM dramatically demonstrated the superb combat capability of the Total Armor Force. The magnificent execution of this mission is providing a wealth of insights and observations which we are using to guide the evolution of Armor in terms of doctrine, organizations, training, materiel, and leader development. The overarching insight is that quality counts — quality soldiers trained to a razor's edge, provided the winning edge in DESERT STORM. But the results of battle also confirm the value of quality leadership. In fact this is every bit as important as providing our force with sound doctrine, effective organizations, and modern lethal weapons. Let's take a closer look at leader development.

Clearly, our current leader development process has been validated on the battlefields of Iraq and Kuwait, but the changing nature of our world and our mission will require us to strive to keep making it better. DESERT STORM commanders at every level have testified to the initiative, competence, and courage of Armor's commissioned and noncommissioned leaders. Armor leaders understand commander's intent, are able to deliberately plan, then aggressively execute mission orders, and seize every opportunity to violently carry the fight to the enemy.

The leader development system which produced these bold men of action is deeply rooted in our history and has evolved over the past decades into one that is, I believe, the very best in the world. Our system is based on the three pillars of institutional training, operational assignments, and self development. It comprises a proven cycle of progressive and sequential education and training, that provides experience, assessment, feedback, and reinforcement. The process begins with the entry into our force of lieutenants and enlisted recruits. We seek those with high potential, a burning desire to succeed, physical and mental toughness, and the motivation to be a member of the elite armor force. Initial mobile armored warfare training is followed by assignment to one of our combat units where their newly gained skills are put to use, expanded and refined in the tough, challenging training environment required to attain and maintain ready combined arms teams. Those who excel are promoted to positions of ever-increasing responsibility. Our goal is simple: to develop tactically and

"Leader training in the institution is only one pillar of the leader development process. The other two pillars — operational assignments and self development — occur in the field."

technically proficient leaders. We want leaders who will be brave and audacious in battle, but calm and seasoned in decision-making. We want them to be practitioners of "mission first, my men always, and myself last." Leaders with these characteristics form the core of our force. And as we look to the future, they must be ready to meet a vastly expanding array of challenges.

•The changing National Strategy demands that the Armor Force be ready for contingencies anywhere in the world. The new strategic realities tell us that Europe is only one theater in which the Army may be deployed. As DESERT STORM and JUST CAUSE have illustrated, our branch may be employed in regions never expected until the order comes.

•The Armor Force must become more expert in rapid, efficient deployment by sea, air, rail, and heavy equipment transporter. Even in Europe, our reduced forward presence will require armor to be ready to rapidly deploy in order to fight.

•The Armor Force must evolve in terms of the mix of armored units (built around the main battle tank) and units of light armor and light cavalry (built around the armored gun system). Armor leaders will need expertise in achieving victory in both types of units.

•The Armor Force must sustain its readiness despite cuts in training budgets. Armor leaders must become experts at planning and executing individual, leader, and collective training that extracts a maximum of effectiveness from every scarce training dollar.

Here at the Armor Center, I consider armor leader development to be our absolute first priority. Leader development courses such as the Basic Noncommissioned Officer Course, Advanced Noncommissioned Officer Course, Armor Officer Basic Course, Armor Officer Advanced Course, and the Pre-Command Course are our most important tasks. They are the last things we will curtail or stop as our own budget steeply declines. You can be confident that the armor leader returning to the field from one of these courses will continue to exhibit high quality skills and competence. We are also insuring that every one of these courses are updated in response to the changing challenges of mobile armored warfare.

But leader training in the institution is only one pillar of the leader development process. The other two pillars — operational assignments and self development — occur in the field. This means that commanders and leaders at all levels hold the quality of the future armor leadership in their hands. We all have to strive to insure that the leaders of the next century will be capable of distinguishing themselves in the same way as was demonstrated in DESERT SHIELD and DESERT STORM. There are a number of tools at our disposal to accomplish this obligation. I will mention only two:

•Military Qualification Standards (MQS). This is the system of standards for the qualification of officers both in common tasks and in armor-specific skills. It is the foundation and guide of leader training for Armor officers. There are three levels. All officer leaders are required to complete MQS-I in their pre-commissioning course. After that, as lieutenants and captains, they are required to complete MQS-II. This is done in both the schoolhouse and in units. Manuals for both of the first two levels of the leader development program are now published. Commanders should be using them to guide their leader development efforts. We are currently developing MQS-III, which will be for field grade officers. The emphasis at this level will be on self-development.

•Excellence in Armor (EIA). The EIA program identifies enlisted soldiers of high potential during OSUT at Fort Knox. They receive additional training during OSUT and will normally arrive at their first unit one rank higher than most other new armor soldiers. Other promising soldiers can be integrated into the EIA program by units in the field. In fact, many of our exceptional armor units are sustaining active extra training programs for EIA soldiers to prepare them for early leadership assignments. Currently, EIA offers the opportunity for accelerated promotion to staff sergeant and is likely to become a discriminator in increasingly competitive promotions to sergeant first class, master sergeant, and command sergeant major as well. If your unit does not have an EIA program, you may be handicapping soldiers with the potential to be the future top leaders of the Army. You can get more information from the Armor Center by using our hotline (AUTOVON 464-TANK).

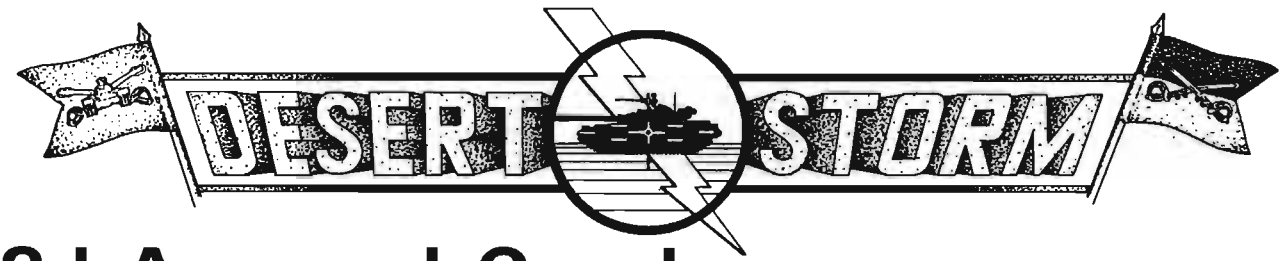
In closing, I commend and congratulate all those who played a part in building the superb armor leaders of today. We owe a big debt of gratitude. Because we can't rest on our laurels, I charge everyone to keep developing fine leaders so that we will be ready to meet the challenging demands of tomorrow. Remember, leadership makes the difference.

Forge The Thunderbolt!

SPC MAURICIO J. SOLANO

SGT CAINS, HHT, 2/2ACR

The squadron's mission varied widely during its deployment to the Mideast, from destruction to humanitarian assistance. At left, an Iraqi T-72 destroyed at the 73 Easting; at right, soldiers rush a wounded civilian to an evacuation helicopter after the cease-fire.



2d Armored Cavalry:

The Campaign to Liberate Kuwait

by First Lieutenant John Hillen, Assistant S3, 2/2 ACR

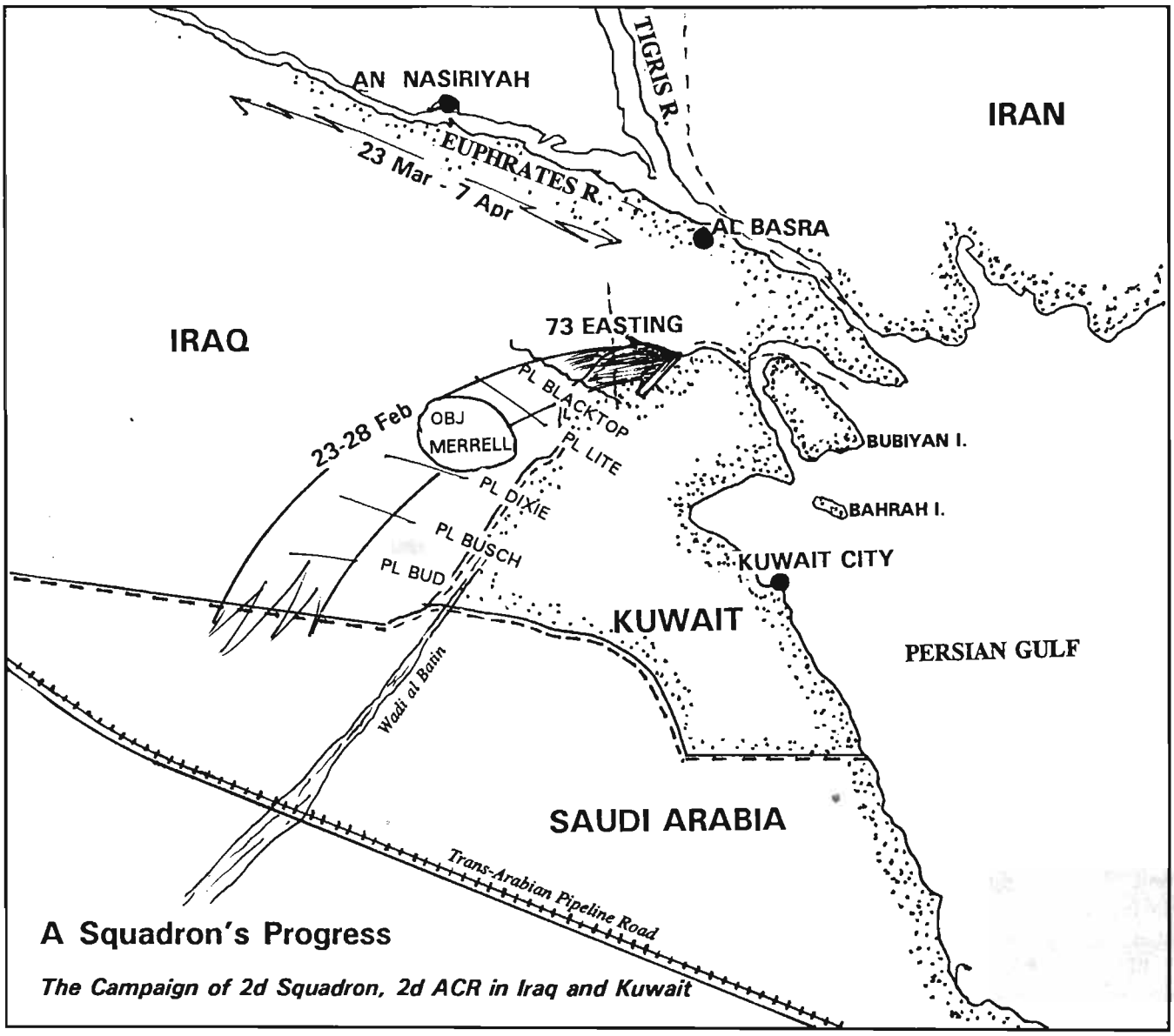
This account chronicles the major events that constituted the squadron's campaign in southern Iraq and Kuwait. For simplicity, events are examined within a daily framework, beginning on 23 February and ending on 7 April 1991. Documents kept in the squadron tactical operations center and in the squadron's forward command post provided the basis for this outline history of the squadron's campaign. It is not intended to be either a complete or final analysis of what happened in the course of 100 hours of periodic contact. The 2d Sqdn, 2 ACR, was commanded by LTC Mike Kobbe.

23 February 1991: The squadron was organized for battle with an engineer platoon and an armored combat earthmover from Co. A, 82nd Engineer Battalion attached to each of the cavalry troops to assist in breaching the berm that ran the length of the Iraqi border. Remaining under engineer control were two smoke platoons, one from the regimental chemical company, and one attached from the 4th ID. The squadron's howitzer battery was under the operational control of 6-41 Field Artillery, in direct support to the squadron. In addition, two psychological operations teams and an EPW team were with Ghost and Fox Troops so the squadron could use their Kuwaiti nationals to broadcast surrender appeals and interrogate prisoners.

The engineer platoons returned to Alpha Company control at approximately 1530 hours after handing off control of their breach sites to D Company, 82nd Engineer Battalion. At 1630, the squadron received orders to advance no farther that day. It encountered no enemy contact, nor was there any evidence of enemy activity in the area in the seven days before the squadron's attack.

24 February 1991: At 0700 hours, the squadron initiated a deliberate zone reconnaissance 15 kilometers forward to PL BUSCH. The squadron reached PL BUSCH and established hasty defensive positions quickly because there was no enemy contact in the squadron's zone.

At 1000 hours, regiment confirmed that there would be no further movement until 25 February. However, due to the significant unanticipated success of ground attacks into southern Kuwait by elements of two Marine divisions, the squadron was ordered to attack in zone to the north, orienting on Objective MERRELL.



A Squadron's Progress

The Campaign of 2d Squadron, 2d ACR in Iraq and Kuwait

At 1430, the squadron attacked in diamond formation across PL BUSCH, with Fox leading, Eagle on the left, Ghost on the right, and Hawk Company in reserve. The howitzer battery moved in the center of the diamond, about two kilometers forward of Hawk Company, in order to provide immediate fire forward. The three firing batteries of 6-41 FA were on line with Hawk Company.

At roughly 1530 hours, Fox's lead scout platoon, 8-12 kilometers in front of the main body, reported contact with dismounts who were later identified as elements of a company-size security echelon. After a brief exchange of fire in which one enemy soldier was killed, Captain Sprowls, the Fox Troop commander, forward with his lead scout platoon, accepted the surrender of an enemy platoon-sized element in dug-in positions forward of larger battalion-sized positions to the north along the southern and northern edge of Objective MERRELL.

Thanks to excellent intelligence and incessant attacks by A-10s on Objective MERRELL between 1300 and 1600 hours, subsequent intermittent firefights between scouts from Ghost and Fox and enemy infantry produced mass surrenders in the squadron zone.

On orders from regiment to refuel, and due to the lingering presence of small groups of enemy infantry, the squadron halted and consolidated along PL DIXIE, approximately 60 kilometers north of PL BUSCH. At 1730 hours, the squadron received orders to halt along PL DIXIE until the next day. Enemy resistance was now broken and nonexistent on MERRELL. Between 1730 and 2400 hours, Fox scouts cleared Objective MERRELL, and between Fox and Ghost, some 240 EPWs were taken. Troops from the squadron's headquarters troop immediately moved forward to take over responsibility for the EPWs and transport them to

PHOTO: SPC HAMMEL

Dug-in T-72, at right foreground, during battle at 73 Easting.

the regimental support squadron. This would become the standard EPW procedure for the squadron in order to avoid burdening the line troops with EPWs. Simultaneously, Eagle Troop engaged and killed 30 dismounted infantry who persisted in firing small arms to Eagle's front between 2300 and 2400 hours.

25 February 1991: At 0630, regiment initiated a 10-minute artillery prep on Objective MERRELL, and the squadron resumed its attack in zone at 0640. As the squadron moved across Objective MERRELL in diamond formation, an additional 30 EPWs surrendered to Alpha Company, 82nd Engineers, which was moving in the rear of the diamond. After moving another 24 kilometers to PL LITE, Fox and Ghost troops were subjected to enemy artillery fire and engaged a company(+) of dug-in infantry, inflicting heavy casualties on the enemy. Despite difficult terrain in the southern portion of the zone, the squadron seized Objective GATES by 1230 hours and more than 200 EPWs were taken.

At 1400 hours, Ghost Troop engaged and destroyed a MTLB-equipped Republican Guards reconnaissance company. 1LT Mecca, Ghost Troop XO, later brought six captured MTLBs to the squadron's forward command post. Regiment ordered the squadron to halt along PL BLACKTOP, 70 kilometers from PL DIXIE, at roughly 1500 hours, despite the squadron having no enemy contact in zone at the time other than the processing of an additional 90-100 EPWs. At 2100, regiment issued orders for 26 February, established a three-sided defense in sector forward of and along PL BLACKTOP. This would disperse the squadron over a considerable distance (40 kilometers), leaving an entire troop (Fox) in the rear in a blocking position along PL BLACKTOP. In addition, 6-41 FA received an order at 1600 hours to switch its direct support to 1st Squadron. The order was rescinded at 2100 hours, but 6-41 spent most of the night moving between the squadrons.

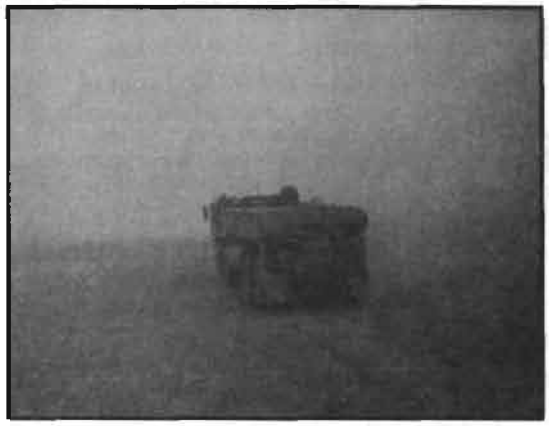
Eagle led with its tanks and punched through the enemy defenses quickly, and destroyed more than 20 tanks and other armored vehicles, as well as several bunkers and supporting infantry.

26 February 1991: At 0620 hours, the squadron moved east to its guard sectors in a box formation with Eagle in the north, Ghost in the south, Hawk in reserve, and Fox guarding the squadron rear, oriented north and northwest. At 0800, Ghost engaged and destroyed the remainder of the MTLB-equipped reconnaissance force it had engaged on the 25th. (The Iraqi commander of this force was later identified as an infantry officer trained at Fort Benning.) Regiment halted the squadron along the PU50 Easting, 10 kilometers short of the assigned guard sector, at approximately 0830. Within the next two hours, regiment relieved the squadron of Fox Troop's mission in the rear, and Fox fell in behind Eagle in the north, while Hawk shifted south to stay behind Ghost. 3d Squadron was also attacking directly east on the squadron's southern boundary, and Ghost was tied in tightly with Iron Troop, 3d Squadron on its flank. Between 1000 and 1200, the squadron received intermittent orders to move east in zone with limits of advance to first the 52, then the 55, then the 57 Eastings.

At approximately 1200 hours, the squadron received a warning order detailing the regiment's new mission as the VII Corps reserve and shifting the squadron's zone south in order to pass 3AD through to the east on the squadron's northern flank. This left the squadron with a zone only nine kilometers wide, and Eagle and Hawk were subsequently shifted south, leaving Ghost leading Fox in the north. Squadron established contact points on its northern flank, and Fox got the mission to make initial contact and coordination with 3AD.

At 1520, the squadron abruptly received the order to continue the attack in zone to the east with an initial limit of advance of the 65 Easting. The squadron attacked east at 1525. After experiencing no contact between the 60 and the 65 Easting, squadron asked for and received permission to continue to the 70 Easting. In the southern portion of the zone, at approximately the 68 Easting, Eagle encountered prepared defenses in zone, with dug-in infantry in bunkers and tanks in

Above, a T-55 abandoned by the Iraqis at the 73 Easting.
Photo: SGT Caine



At right, a LOGPAC truck moves out in a sandstorm. While the storms greatly reduced unaided visibility, the thermal sights on armored vehicles easily pierced the haze.
Photo: SGT John C. Gardner

revetted positions. Small and sporadically placed anti-personnel and anti-tank minefields were identified and bypassed in both the Eagle and Ghost zone. Eagle led with its tanks and punched through the enemy defenses quickly, and destroyed more than 20 tanks and other armored vehicles, as well as several bunkers and supporting infantry. This enemy force was later identified as a security echelon of the Tawalkana Republican Guards Division. Eagle then moved up on line with Ghost along the 70 Easting after this brief action, but was still located in the midst of the enemy defenses.

During this attack, a sandstorm and mist cut visibility to 800-1000m, but thermal sights could easily identify enemy out to 3000 meters. This provided the squadron with an incredible advantage throughout the fighting. While halted along the 70 Easting, the squadron received an ineffective artillery barrage and requested and received permission to move forward to the 73 Easting. 3d Squadron also received artillery and withdrew to the 68 Easting, forcing Eagle to move scouts back in order to refuse the squadron's right flank by keeping contact with Iron Troop.

Upon moving forward to the 73 Easting, both Eagle and Ghost acquired numerous armored targets moving in their zones. The majority of these targets were elements of the Tawalkana and 12th Armored Division continuing to defend or fleeing north in zone. The squadron's howitzer battery and 6-41 Field Artillery engaged numerous enemy armor targets forward of the 73 Easting with more than 2,000 rounds of cannon fire. One fire mission of particular importance was an immediate suppression mission initiated by the Ghost FIST that prevented enemy T-72s from overrunning Ghost's 3d platoon. Another mission initiated by the Eagle FIST fired 128 DPICM rounds and 12 MLRS rockets on armored vehicles moving beyond direct fire range. We observed numerous secondary explosions and suspected, based upon interviews with EPWs, that this mission destroyed up to a battalion of enemy armor and support vehicles.

Concurrently, Eagle and Ghost were engaged in a heated direct fire battle with elements defending in the Eagle sector and elements moving north into the Ghost sector. TOW missiles, 120-mm main gun, 25-mm, and machine gun fire destroyed more than 30 tanks and 40 other armored vehicles, as well as supporting trucks and infantry. One Bradley from Ghost was damaged by enemy fire, and the gunner was killed, while two troops were wounded.

At approximately 1800 hours, Ghost reported that it was in a "black" status on TOW missiles, and Hawk was mobilized to move up and relieve Ghost in its sector. By the time the relief was effected, the sector was quiet and clear of targets. At approximately 2000 hours, the psyops team was brought forward to broadcast surrender appeals in the Eagle sector. More than 100 EPWs were apprehended at that time.

Concurrently, leaders coordinated to assist the forward passage of lines. Alpha Company, 82nd Engineer Battalion ran the dual mission of marking the minefields in the squadron zone and marking the lanes for the passage of lines. But confusion existed concerning the method of passage. Squadron planned to assist passage of the 1st ID lead brigade, cavalry squadron, and 6-41 FA. The lead brigade S-3, however, stated

The squadron destroyed more than 55 tanks and 45 other armored vehicles, an equal number of trucks, hundreds of infantry, and captured approximately 865 prisoners.

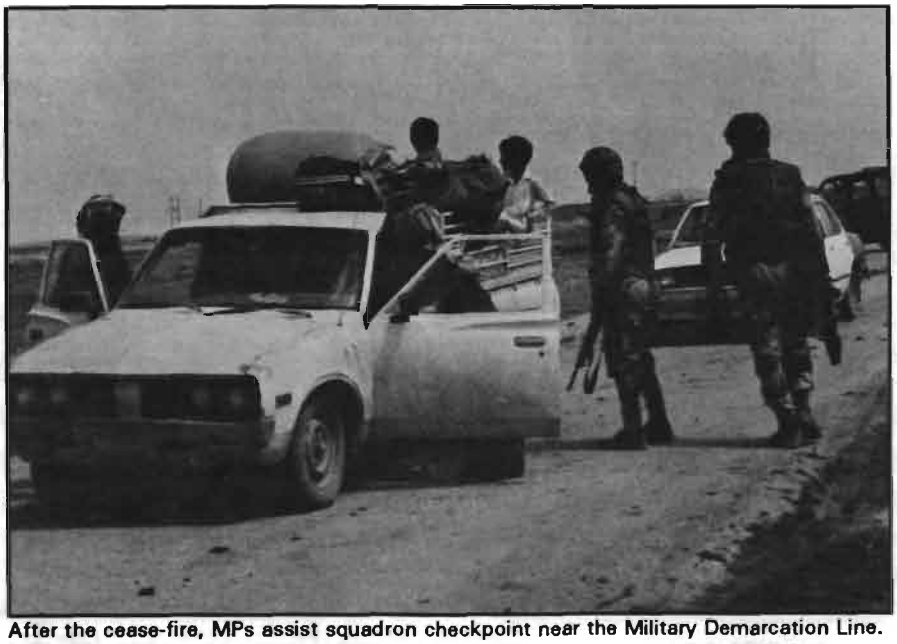
that the brigade and follow-on units were positioned 10 kilometers south of the six lanes that squadron was instructed to create. The 1st ID concept was simply to pass through the 2ACR FLOT where it was convenient for its units. No units of 1st ID used the squadron sector to pass through initially, but 1-4 Cavalry did pass through the northern portion of the squadron sector at 0300 the following morning. 6-41 FA was detached from direct support to the squadron and followed 1st ID East.

27 February 1991: Squadron remained along the 73 Easting until approximately 0800 hours, when friendly fire from 3AD units passing to the north necessitated pulling back to the 70 Easting. The friendly fire was apparently aimed at enemy to the squadron's front, but rounds impacted in the Eagle sector. Squadron remained in these positions for the rest of the day and processed 139 EPWs who had surrendered on the 26th, as well as an additional 80 who surrendered on the 27th. Squadron received a corps cease fire order at 0730.

28 February 1991: The squadron moved east at 1000 hours in order to follow the corps movement and was halted at the 85 Easting for the remainder of the day. An additional 105 EPWs were taken and processed. Alpha Company, 82nd Engineer Battalion began to systematically destroy enemy equipment and bunkers left in the squadron zone.

All told, and by best estimate, the squadron moved almost 200 kilometers through southern Iraq in less that 80 hours of periodic contact between the afternoon of 23 February and the evening of 26 February. The squadron destroyed more than 55 tanks and 45 other armored vehicles, an equal number of trucks, hundreds of infantry, and captured approximately 865 prisoners.

On the morning of February 28th, a cease-fire was declared and the fighting was over.



After the cease-fire, MPs assist squadron checkpoint near the Military Demarcation Line.

Photo: SGT Caine

After the Cease-Fire

23 March - 7 April 1991: The squadron received the mission to relieve a brigade of the 82d Airborne Division and occupy the northernmost sector of the allied zone of Iraq, thereby screening the portion of Iraq occupied by the VII Corps.

The sector roughly followed the line of the Euphrates River and was centered on the town of An Nasiriyah. A demarcation line between Iraqi and Allied forces had been established about 10 kilometers south of the river and the sanctity of the temporary cease-fire was strictly observed.

The squadron screened along a 45(+)-kilometer front with Ghost Troop in the west, Fox Troop in the center, and Eagle Troop in the east. Eagle was augmented with military police and had the responsibility of manning three checkpoints on the major highway that connected Baghdad and Basra. 6-41 Field Artillery and the squadron howitzer battery were positioned to provide fire support throughout the sector, but with the ability to mass on and about An Nasiriyah, the only location in sector where the Iraqis could move unobserved.

Across the river, the ongoing civil insurrection between Iraqi loyalists and Shiite rebels kept the squadron prepared for any contingency. Iraqi soldiers fleeing the fighting were taken and processed as POWs, and civilian refugees in the area were given food, medical treatment, and other humanitarian aid by the squadron. The squadron took more than 2,000 POWs during this period. The squadron returned home to a hero's welcome on April 22nd and 23rd, 1991.

The Armor Force and Heavy Equipment Transporters:

A Force Multiplier?

by Colonel L. M. "Mac" Johnson and Lieutenant Colonel Thomas R. Rozman

Introduction

Heavy Equipment Transporter Systems (HETS) are an established fixture of the military environment. Most of the world's armies have been using this asset in significant ways as part of their armored force operations in war and peace. The basic idea of preserving the mounted tactical mobility system's capabilities up to the tactical employment threshold, e.g., the tank maneuvering on the battlefield, is one the U.S. Army actively pioneered in the period between World Wars I and II.[1]

The allies in the Gulf War used many commercial trucks to move vehicles across the expanses of Saudi Arabia, a nation unusually well supplied with these vehicles because of the oil industry.

For a number of reasons, despite this early initiative, the systematic application of HETS doctrinally in the U.S. Army in peace and war, has lessened in recent years. This situation has resulted from such experiences as Vietnam and more recently, relatively plentiful funding for training and operations. Additionally, a significant feature of the last 40 years, has been a focus on linear defense in Europe where armored and mechanized units were organized behind a uniform, shifting forward line of troops. We did not have an operational requirement for HETS employment. The present orientation on contingency operations (CONOPS) theaters that has tended to focus on light and special operating forces added to the continued low priority of the HETS capability. Today, the emerging non-linear aspect of the Army's future warfighting concept, AirLand Operations, are establishing such a requirement.

But, the Army hasn't been "asleep at the switch." Individuals within the Army have understood and actively sought to develop and employ this asset. As a collective body, the Army, for good and not so good reasons, arrived at the post-Cold War, Desert Shield point in history shy in this area.

HETS as an operational and training asset have begun to attract more Army interest. Investigations by the Army's AirLand Operations initiative of possible theaters of operations has shown that even if the chances of war in the European theater are reduced, a number of other theaters still have significant heavy force requirements. With these requirements come the traditional tactical and operational mobility challenges of heavy forces.[2] Obviously, Southwest Asia is one.[3]

In addition, as costs for traditional heavy force training spiral upward, (road and tank trail maintenance, fuel, lubricants, and spare parts costs, etc.), solutions to conserve these vital training assets for best use are needed. This is particularly true if the force today and tomorrow is to remain trained and trainable to standard.

In the context of such an environment, this article reviews the bidding on HETS possibilities for the armor force from a training perspective. Specifically, it examines the training implications for HETS in today's and tomorrow's heavy force in emerging contingency operations, continental U.S. (CONUS)-based, power projec-

tion world. The examination leads to a proposed HETS training concept approach in two areas: training in HET use and HETS as a training resource.

HETS in the Training Environment

It is not possible in this article to detail the known or possible warfighting applications of HETS that may emerge as AirLand Operations mature. The U.S. Army, as do most other armies, recognizes the contribution this system can make to operational heavy force mobility and the preservation of heavy force combat vehicles for battle employment, not to mention their role in resupply. In this context, HETS have been part of the force and are a standing modernization requirement of the Army's development system.[4]

Previous discussion indicated the problems of de-emphasis on the asset in the competition of systems within battle doctrine, funding battles within the Department of Defense, and projected warfighting ideas, have frequently left too few HETS available to an Army that has instinctively applied the resource in its operations. Soldiers and units just haven't gotten enough practice. Because units know how few HETS are available, they tend to seek other means. HETS simply haven't been as glamorous as tanks, Apaches, infantry fighting vehicles, etc., when it comes to what players in the force fielding business have focused on. The consequence, with occasional exceptions, is an Army that comes to HETS loading, movement planning with HETS, reconstitution operations, etc., by exception rather than by habit, both in training and in battle. The training fallout is that generic force training strategies and actual unit training programs in the field do not, as a rule, train in use of these systems. Individuals, crews, and units are not systematically trained on:

- Load and movement planning
- Loading site selection and preparation
- Loading
- Unloading site selection and preparation
- Unloading

Leaders are not regularly instructed and trained in HETS capabilities for and application in:

- Tactical movement
- Operational movement
- HETS planning
- HETS, as a training resource, e.g., movement to training sites to conserve OPTEMPO for tactical maneuver training and range gunnery use.

In defense of this situation, it can be said that all of these things may be intuitively obvious to the professional. But, Clausewitz said it pretty well, "the simple is hard in war." It is reasonable to extrapolate from that basic thought to something else, "what we don't practice (read, train) regularly in peace, we will not do in war."

A reasonable conclusion from this discussion is that AirLand Operations in the contingency operations environment point toward a requirement that heavy forces be competent in HETS capability, both in equipment and proficiency of employment. If this is so, then developing heavy force proponent training strategies in the Combined Arms Training Strategy (CATS), both institutional and unit, should increase emphasis on HETS employment.

From the training resource aspect, HETS use should be factored into these strategies. This means identification of where the HETS asset is applied and how much is necessary to support training strategy events. The key application has been mentioned, i.e., to conserve scarce combat vehicles' OPTEMPO, a vital and consumable training resource, for tactical maneuver in the maneuver box or movement on the range for service gunnery, not movement from garrison or cantonment to these sites.

When we consider that it costs, according to various sources, at least eight times more to drive a tank a mile than it does to move it a mile aboard a HET, a blinding flash of the obvious results.[5] Movement by HETS to and from the training site would be dramatically more cost-effective. But, if HETS are not available to resource this movement, and those that are are insufficiently reliable, so what? Training planners cannot train on wishes.

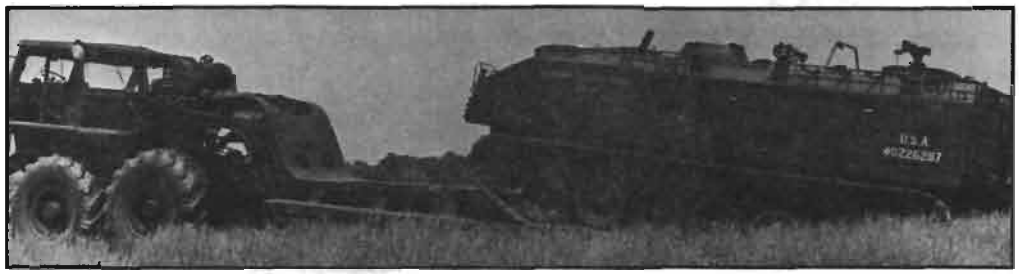
To address this point, two options are apparent:

- If the AirLand Operations warfighting concept and training strategy define this valid requirement, then acquire and man the necessary number of HETS and HETS units.
- Contract the resource.

From a mission standpoint, the first option is more attractive. Theoretically, an organic asset is more disciplined, responsive, and available. However, if funding trade-offs do not produce the Army-owned asset in sufficient quantity to meet requirements, contracted assets can obviously meet the need. Even if sufficient Army HETS could be acquired, the contract option may still be desirable to soften aging effects on the operational fleet. Also, if there are periodic cost differentials in the marketplace between the Army's HETS and contracted systems, the latter being less expensive, it may be

HETS in World War II

At right, a British Matilda infantry tank is loaded on a Scammel tractor-trailer in the Western Desert. British used these trucks both to transport and recover tanks.



The U.S. heavy transporter T-8, developed during WWII, is seen here hauling an M-44 armored utility vehicle in postwar tests at Aberdeen Proving Ground, Md. A second cab permitted steering from either end. This transporter had an all-wheel drive.

wise to retain an ability to take advantage of the periodic savings.

This discussion seems to lead to a logical conclusion that HETS as a training resource may best be represented in terms of HETS-miles-per-tactical vehicle. This would allow flexibility in terms of HETS source. The problem in this approach is determining a yardstick for identifying the number of HETS necessary to support a proponent's (integrating center or school) baseline training strategy. The same situation that exists for tactical vehicle OPTEMPO occurs here; some units and locations have a high OPTEMPO, others do not. Some commanders have training sites a mile or two from the motor pool, others, 20 or more miles. What is the mean, and how is it determined? The answer may well move into an arbitrary resource figure as we have with combat vehicle OPTEMPO. However, these last points do not detract from the obvious conclusion that developing heavy force proponent training strategies should incorporate HETS as a training resource.

A HETS Training Concept

The preceding discussion suggests the following HETS training concept:

•Training

•Incorporate the following HETS-related training into appropriate elements of the emerging CATS proponent strategies.

-Training in existing or developing HETS operational or tactical doctrine.[6]

-Training land and movement planning.

-Loading and unloading training.

•Leader training in HETS capabilities for:

--Tactical movement

--Operational movement

--HETS employment planning

--HETS as a training resource (movement to and from training sites to conserve tactical OPTEMPO)

•Training resource — use HETS to conduct all heavy force movement that is not directly involved with maneuver on terrain or service gunnery on terrain.

•Movement to or from maneuver areas

•Operational movement during exercises

•Some tactical movements

This HETS training concept emphatically recognizes the force multiplier role HETS should play in AirLand Battle and most probably will play in AirLand Operations. It clearly states the responsibility of CATS to capture the training requirement and most critically, in a time of identifying how to train the force to standard smarter, on fewer resources, the training resource role of HETS.

The good news is that initiatives are already afoot to imbed this concept in the training system. This paper essentially synthesizes the thought behind them and focuses the possible objective.

Conclusion

Operational and tactical employment of HETS and their use as a movement resource to and from training sites to conserve the tactical movement capability of mounted force is not new to the U.S. Army. We have been playing with the idea, and in many cases, using it very well, since the pre-WWII period. However, standardized and habitually

effective application of HETS has atrophied, if for no other reason than because so few of an aging HETS fleet have been available.

In this paper, based on an emerging re-emphasis on this resource, a training concept for HETS has been defined. Essentially, it proposes the standardized incorporation of HETS into the training system in two ways:

•As an element of training soldiers, crews, units, and leaders in our emerging CATS proponent training strategies.

•As a planned training resource to support execution of those strategies, conserving scarce tactical vehicle OPTEMPO for actual maneuver on terrain and gunnery.

Success in the implementation of this concept will certainly result in a more effective use of HETS. It will also produce a more effective mix of heavy force training resources that may allow the Army to more effectively deal with anticipated budgetary impacts on tactical vehicle OPTEMPO through time.

Notes

[1]During the 1930s, the U.S. Army actively developed and matured a doctrine in its horse/mechanized cavalry regiments of moving the horses and combat vehicles of the regiments by transporter when moving operationally. To some degree, this was a response to cost issues in that fund-constrained Army, but it also was viewed as a valid war doctrine and capability that expedited operational movement and preserved optimum levels on the battlefield. Apparently, the doctrine reached a fairly significant level of maturity before World War II. Some insight regarding these earlier efforts may be obtained by reading General Lucian K. Truscott's book, *The Twilight of the U.S. Cavalry — Life in the Old Army, 1917-1942,* University Press of Kansas, 1989, pages 95-97 and 170-171.

[2]Review of current AirLand Operations material highlights the point of heavy force opposition in many possible CONOPS theaters.

[3]Emerging operational requirements in Southwest Asia (SWA) have identified significant requirements for HETS and have led to major efforts to expand HETS numbers in theater.

[4]The Army has an established acquisition program to replace its current M911 tractor and M747 trailer with the M1070 tractor and M1000 trailer.

[5]According to an undated Tank Automotive Command (TACOM) information paper, subject, Heavy Equipment Transporter Systems (HETS), published by the program manager in the June 1990 time frame, the current M911 tractor and M747 trailer consume $150 of OPTEMPO/mile hauling an M1-series tank compared to $800. The same paper indicated $30-$50/mile for the replacement M1070 tractor and M1000 trailer. The paper's purpose was to provide the Joint Armed Services Committee with information concerning the impact on the force of reducing HETS funding. To illustrate the danger of employing any of this data without comparison, depending on who is preparing the data, FY92 budget sustainment cost factors (4 June 1990) show a $110-$150/mile OPTEMPO consumption rate for all commands. However, these figures only reflect repair parts, spares, and fuel costs. Discussion with several staff personnel at Deputy Chief of Staff for Combat Developments and Doctrine (DCSCDD), Training and Doctrine Command (TRADOC) seems to indicate that such disparities are not uncommon, depending on who is presenting data, and that the FY 92 figures do not reflect all amortized life cycle costs, such as, maintenance, lubricants, rebuilds, etc.

Most recently offered data shows (briefing from the Transportation School for CG, TRADOC [January 1990]; source PM Combat Vehicles using data from an M1A1 operating cost report of FY 89 from Materiel Readiness Support Agency's (MRSA) annual Tactical Vehicle Report for FY 89) a cost per mile (OMA only) of:

M1A1	$588.75/mile
M911/M747	$36/mile

[6]Existing Army HETS employment doctrine is in FM 55-30.

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Lieutenant Colonel Tom Rozman is currently assigned to the Collective Training Directorate, Office of the Deputy Chief of Staff for Training, TRADOC. Before this assignment, he served on the Armored Family of Vehicles Task Force, DA; as Chief, G3 Training Resources, 1st AD, USAREUR; XO, 1st Battalion (Mech), 46th Infantry and 2d Battalion (Mech), 6th Infantry; and commander, Company A, 1st Battalion (Mech), 58th Infantry. He has also served as Infantry platoon leader in Korea and S3 Air of an Infantry battalion at Fort Benning. He is a 1970 graduate of USMA, and holds an MBA from the University of Massachusetts. He is a 1983 graduate of the Army Command and General Staff College.

Future Armor Rearm System (FARS)

by Nelson F. Gravenstede

Modern weapon systems are designed to fight and deliver maximum firepower, but they lack the ability to carry large amounts of munitions aboard or to reload rapidly to perform sustained combat operations. Each combat unit must return to a resupply point for replenishment to keep it an effective fighting force. Of all these supplies, ammunition is perhaps the most critical, and the task of resupplying ammunition is becoming ever more complex.

Presently, the world's most lethal main battle tank, the M1A1 Abrams, must be rearmed one round at a time through the top of the turret, while the Army's howitzers must load four separate components — fuze, primer, propellant, and projectile — for each artillery round. The M2 Bradley fighting vehicle's ammunition stowage and rearm methods need improvement to sustain intense combat operations. The Cobra and Apache helicopters must spend considerable time on the ground to rearm. The concept of rapid rearm and resupply requires integration and optimization of the combat soldier's needs in relation to his weapon and those of the logistician and his resupply system.

To enhance this critical element of warfighting, several advanced technology programs are underway at Picatinny Arsenal, N.J., to improve weapon system rearmament. New systems in development for armor, artillery, infantry, and aviation promise a new era of rapid battlefield rearmament.

Armor units resupply during lulls in combat, or when necessary to replenish combat loads. This generally occurs behind the forward line, and the preferred method is to rearm from a resupply vehicle. Rearmament is usually carried out in the open through the crew hatch, exposing the weapon and crew to overhead and small-arms fire. Studies by the Armor School indicate the combat vehicle is particularly vulnerable at this time, and the exposure time is significantly increased when in an NBC environment.

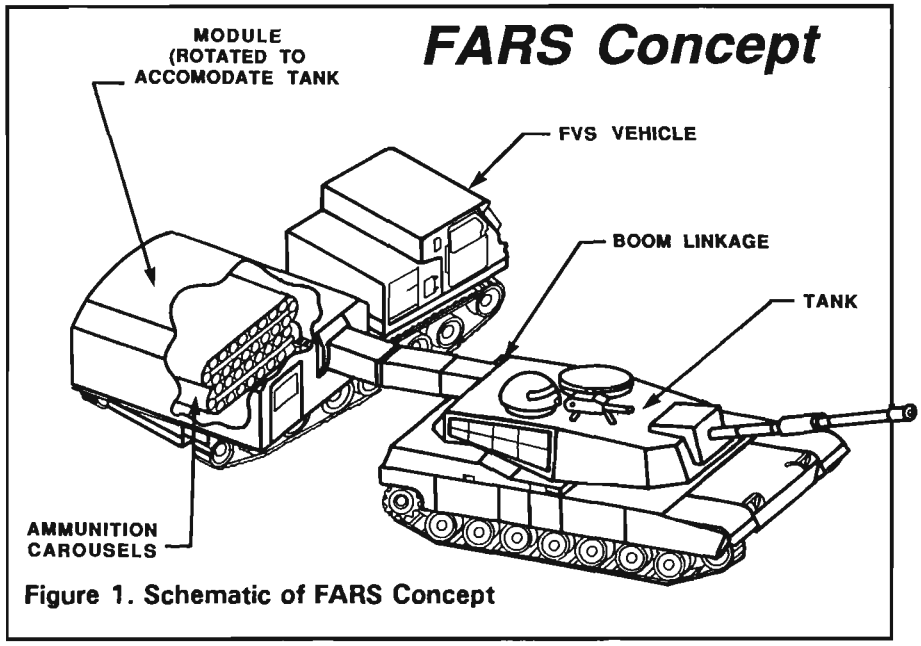


Figure 1. Schematic of FARS Concept

Meanwhile, new developments in ammunition and armor protection and continuing threat improvements in armor protection have dictated increased weapon and ammo performance. This results in heavier or more sensitive ammunition, such as the 120-mm combustible cartridge case round that was fielded for the Abrams tank. In conjunction with these concerns, developing a rearm and resupply system capable of efficiently supporting the armor system in the forward area is our major challenge. The Project Manager for Ammunition Logistics (PM-AMMOLOG) has established a program, the Future Armor Rearm System (FARS), to meet deficiencies in rearming armor units. The FARS program is intended to develop, integrate, and demonstrate technologies capable of moving present and future one- and two-pieced ammunition from a rearm vehicle into the bustle of the future tank. This program is under the direction of the Project Manager for Ammunition Logistics, and includes representatives of the Human Engineering Laboratory, Oak Ridge National Laboratory, and Tooele Army Depot.

Concepts for handling and transferring ammunition were conceptualized in 1989, and a demonstration is scheduled in conjunction with the Advanced Tank Cannon (ATAC) System in FY 92 and the Tank-

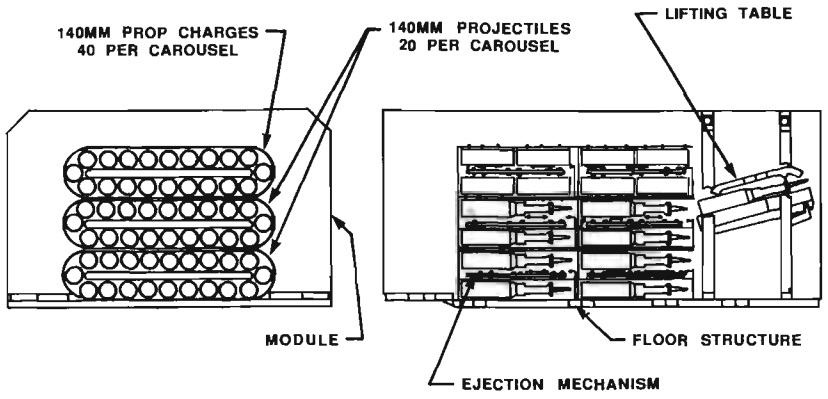


Figure 2 - Carousel Storage System in Module

Automotive Command CATTB in FY 94. The concept calls for a module mounted on the rear of the MLRS medium-type chassis. A bearing and drive motor mechanism allow 360-degree rotation of the module. In the travel mode, the module boom is oriented over the chassis cab. The rotating module permits the rearm vehicle to load ammo into the tank from either side or over the rear deck (see figure 1). Rotation of the module and manipulation of the extendable boom are controlled by an operator from the front seat of the vehicle cab. Using video and sensing devices, the operator can align the boom with the tank's rear rearm port, thus permitting the boom to "dock" with the tank. The operator can select and transfer ammunition from the cab.

A series of three rotary carousel magazine storage cells within the module hold either a projectile or two propellant charges for the new two-piece ATAC 140-mm ammunition. There are twenty projectiles in each of the lower two carousels, and forty propellant charges in the top carousel (see figure 2); thus each stack contains forty complete rounds. Stacks of carousels are to be placed in tandem allowing the module to hold 80 or 120, depending on the module length.

A single extractor mechanism with powered rollers (see figure 3) permits the removal of a cartridge component from any cell in the carousel. The operator moves the carousel until the desired component is above the extractor mechanism. The extractor can pass ammo from stack to stack, or from one cell to a lift table located in the module in line with the transfer boom (see figure 2). The lift table takes the component from the carousels, then moves in pitch and elevation to align with the conveyors located in the transfer boom. The conveyors move the ammo through the articulated boom to the tank, where it is passed through the docking port to the awaiting cell of the tank autoloader.

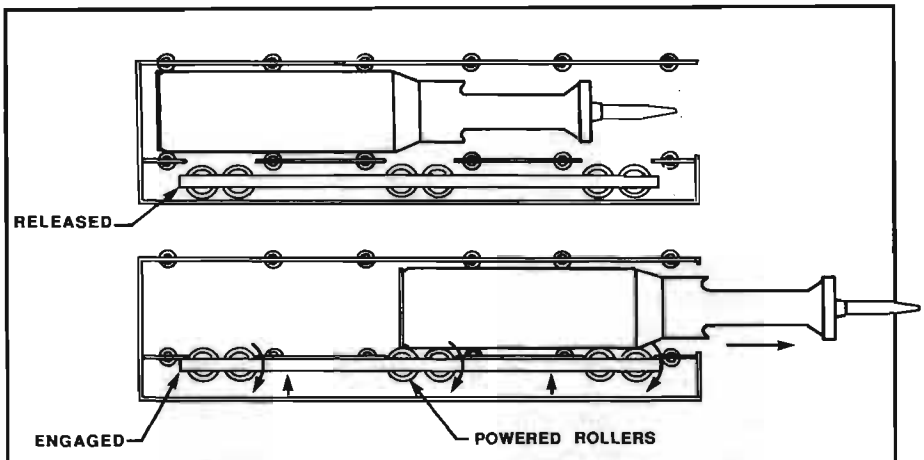


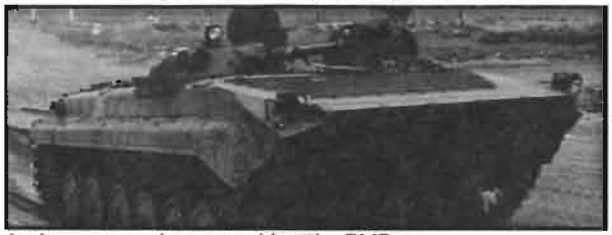
Fig. 3 - Extraction Mechanism

Exploring tomorrow's issues today, with emerging technologies, is just another way the Project Manager for Ammunition Logistics provides professional and imaginative solutions to ammunition logistics.

Nelson Gravenstede is currently the Armor System Project Officer at the Office of the Project Manager for Ammunition Logistics, Picatinny Arsenal, N.J. With a background of working on armor systems during all of his 25 years of government service, his most recent program was the development and fielding of the logistically improved PA116 metal container and pallet currently used to package all 120-mm tank ammunition for the M1A1 fleet. Constantly striving to improve the ammunition logistics systems for the Armor Force, he currently is managing the Future Armor Rearm System tech base effort to permit tank rearmament under armor in the forward area.

Barracks of Regiment 22 at Torgelow, formerly E. Germany

Officer and NCO housing of Panzer Regiment 22



Author gets a chance to drive the BMP.

Author inspects gun tube of T-72 in heated shelter.

BMP at firing range near the Baltic Sea. A T-72 is parked behind.

A Close Look At a T-72 Regiment

by Colonel Dale Stewart, USAR

Last December, as part of the U.S.-German Armor Combat Development Exchange Program, I had the opportunity to visit a panzer regiment that, two months earlier, had been part of the East German Army's 9th Panzer Division and a key unit in the armies of the Warsaw Pact.

Before 1987, the mission of Panzer Regiment 22 had been to cut off NATO forces just north of Hamburg and then plunge ahead to the North Sea. From 1987 to reunification, during the thaw in the Cold War, its mission was defensive — to occupy a defensive sector along the eastern bank of the Elbe River. The unit had been ready to roll for 35 years. Panzer Regiment 22 had been based at Torgelow, 15 km west of the Polish border, since its organization in 1956, when it was equipped with Soviet T-34 tanks. In the years that followed, it received the best of the Soviets' new equipment: the T-54 in 1957, the T-55A in 1968, and in 1983, it was equipped with the T-72M, the Warsaw Pact's most advanced tank at that time.

During these Cold War years, the regiment had been at 100 percent readiness, with all personnel quartered within minutes of the tank parks. In the parks, the tanks were fully uploaded and 100 percent maintenance ready. Exercises confirmed that the battalions could be out of the motor parks within 20 minutes and in assembly areas within 40.

My general impression of the trip was that the East German Army would have been a formidable foe, had war occurred. Its state of readiness far exceeded U.S. and West German assessments. Soldiers were well trained and led by capable officers.

What We Saw

At the time of reunification last October, Panzer Regiment 22 had its full complement of 94 T-72Ms, 31 BMP-1s, 37 wheeled infantry fighting vehicles, and 178 trucks, along with 600 tons of ammunition. The equipment was in excellent condition, with all fighting vehicles stored in heated shelters. NBC equipment was plentiful.

As part of our visit, I had a chance to drive both the T-72 and BMP and found both to be responsive and

maneuverable. TC and gunner positions, however, were entirely too constrained, and one of the Bundeswehr officers who accompanied us said he doubted a TC could remain effective after even three hours on the road in these cramped conditions, but one of the former NVA officers insisted that this presented little problem for the crew. He said soldiers understood that the tank was built for the attack, with little concern for how it would perform in a defensive role or for crew comfort.

One drawback of the T-72 was limited gun tube depression, a liability in the defense. Another was that the gun tubes eroded quickly, requiring replacement after firing only about 200 rounds of kinetic energy ammunition. Track required replacement after 1200 km. The biggest complaint we heard from soldiers who had used the tank was that it took up to four days to replace an engine.

Both Panzer Regiment 22 and 21 had T-72s made in the Soviet Union, while Regiment 3's T-72s were made in Poland and were considered inferior. The tanks that were uploaded and prepared to go were not in daily use. A small number of training tanks were used by the troops for all gunnery and tactical training.

Manpower and Morale

The original TDA strength of Panzer Regiment 22 was 945 officers and men. Following reunification, when Bundeswehr Command East took over the operations and equipment of all former East German Army units, Lieutenant Colonel Luft, the new commander, along with seven Bundeswehr officers and NCOs, became the nucleus of the new unit. In addition, 400 former East German officers and men remained from the original strength.

In the course of our discussions, the consensus was that the East German soldiers were well trained and completely familiar with their jobs, but few were cross-trained. The three battalions were commanded by a lieutenant, a captain, and a major, with each unit having up to five deputy commanders. There was a political officer assigned at both battalion and regimental level. Over 30 percent of the regimental strength was in officers, with, in some cases, majors and lieutenant colonels working technical positions under a lower ranking commander. Some 10 percent of the officers had been selected to attend a four-year course in the Soviet Union, covering Soviet tactics, doctrine, and the Russian language.

Each battalion lived in a separate barracks building, but the quarters, the unit messes, and other facilities for creature comfort were unsanitary and in bad need of repair. Buildings were heated with brown coal (soft coal or lignite), which leaves lingering smoke in the air and coal dust on everything. The individual rooms in barracks were neat and quite livable, but there were no locks on the doors, so it was customary to seal the doors with thread and wax, which, when broken, indicated unauthorized entry.

All administrative functions were carried out at the regimental level, leaving companies and battalions free to carry out training missions. Only one phone was authorized per battalion. Training maps were considered classified material, and few soldiers ever saw one.

The spacious training areas south and east of the camp were only five to ten minutes away. The range was large, permitting three tank platoons and a BMP company to run concurrent exercises. Crews were allowed to fire 20 rounds of HE a year, using the training tanks. Because of the limitations of the new Conventional Forces Europe Treaty, Germany can retain only so many tanks, and for logistic reasons, it is unlikely they will keep the regiment's Soviet equipment in service. It may be transferred to other nations within NATO or destroyed.

The regimental organization will change, too. The Bundeswehr plans to reorganize with an active tank battalion, a reserve cadre tank battalion, and an antitank company, for a total of 689 officers and men. At present, many of the East German officers and enlisted men have been incorporated into the Bundeswehr. Some officers will be released shortly, while others will be retained for at least two years before any final decision is made. Meanwhile, the officers and NCOs will train in Bundeswehr procedures in four-week courses at Munster and Koblenz.

Colonel Dale Stewart, USAR, is the International Research and Development Officer for the Directorate of Combat Developments, Armor Center, Fort Knox, Ky. As a Reservist, COL Stewart is the commander of the 2d Brigade, 100th Division, Owensboro, Ky. He was commissioned in Armor from the University of Southern Mississippi in 1964. He has served as armor platoon leader and tank company commander in both Korea and Germany; battalion operations officer, and as an attack helicopter pilot with the 1st Cavalry Division in Vietnam. He is a 1980 graduate of the Command and General Staff College. His reserve assignments include instructor for CGSC; commander, 3d Battalion, 339th Armor, Hopkinsville, Ky; and brigade executive officer.

The Neglected Tank Crew Member: Training the Tank Loader

by Sergeant First Class Michael F. Capobianco

SSG Johnson, the tank commander of B32, was sixth in line to fire on Range 117, TTVIII, Grafenwoehr. His gunner had just finished assisting the commo sergeant with installing and checking his jump radio. Going over the engagements and fire commands in his head, Johnson wondered how well SPC Moore would perform as loader during his qualification run. SPC Moore was the driver for B21 and had never trained with Johnson's crew.

With the impending large scale PCS/ETS of many tank crew members from USAREUR upon their return from Operation Desert Storm, most armor battalions will go into their next gunnery densities with less than 50 percent of their tank crews stabilized from their last gunnery. As any tank commander will tell you, the least stabilized position is the loader's.

SPC Moore climbed aboard the tank just as the range OIC called SSG Johnson to change over to the firing frequency. Moore plugged in his CVC, made sure that he could talk and hear everyone over the intercom, and opened the ammo door to check on the placement of the rounds in the ready ammo compartment. As the door closed, Moore called over to his new TC and said "Let's put some bullets downrange!" Johnson looked at Moore, saw a slim, tall soldier who was breathing hard from his run from the debriefing tent, and thought "Well, at least he's fired up, and he took the initiative to check things on his own."

As most tank commanders will tell you, it is rare that they get to keep

the same loader across a number of gunnery densities. They will also tell you that the loader will make or break your engagement times. The loader must be able to fit his agility, strength, timing, and technique within the "rhythm" that the tank crew has established. If the loader is out of synch with the crew, then the crew is out of synch. With that in mind, training the loader should be paramount in the minds of tank commanders. But it's not.

SSG Johnson positioned his tank at firing point 1, lane 2, as instructed by C92, his TCETT evaluator on the radio. "B32, this is C92, battlecarry Sabot and give me a ready report, over." Johnson knew that the engagement would be two moving tanks.

"Battlecarry Sabot and give me a crew report," said Johnson over the intercom. SPC Moore opened the ammo door and began to extract a Sabot round. As he did so, SSG Johnson saw that his loader seemed to struggle with the round once it cleared the rack. Placing the round on the loading tray, Moore pushed the round with a flick of his arm.

The round traveled three quarters of the way into the chamber before it wobbled and stopped. Moore reached over and pushed the round into the chamber. "Sabot loaded, loader ready," announced Moore, "Tac Idle on, driver ready," said PFC Wilson. The gunner, SGT Raez, ensured Sabot was indexed, checked his logic switch on the laser rangefinder for last return, and began his scan of the range. "Sabot indexed, gunner ready." Johnson took all of this in and smiled to himself. "Not bad," he thought, and took one last look at the guards and safeties. "C92, this is B32, REDCON 1."

With the increase in weight of that the 120-mm cartridge, upper body strength is an important factor in training the loader. By incorporating a two- or three-day-a-week weight training program, your loaders will not only improve their abilities to handle the 120-mm cartridge, but will also increase their APFT scores in the push-up event. Vary the program by placing your loaders in a circle and have them pass a 120-mm dummy round, first at chest level, then overhead, between themselves. This enables them to develop confidence in handling the round, besides building strength and agility. Put this program under the supervision of a junior sergeant and use it as a leadership development tool. Results can be readily seen and evaluated.

"Driver, move out," announced Johnson to begin the engagement. Wilson brought the tank up through the gears and steadied out at about 17 mph. Raez was scanning the full width of the range through his thermal in smooth, steady traverses when he yelled, "Two moving tanks direct front!" Johnson dropped down to the TC's extension while at the same time announcing, "Gunner, Sabot, two moving tanks, nearest tank." Raez switched the gun select switch to main. While watching Raez track and get a good lay on the first tank, Johnson heard Moore announce "Up" to indicate that the path of recoil and the turret was clear for firing. Raez lased to the target. A range of 1480 with no multiple returns appeared in the GPS. Johnson evaluated the range in a split second and announced "Fire!" Raez yelled "On the way" and squeezed the triggers. A dull "thud" followed quickly by a rattling "clank" reverbated in the turret.

Johnson was glued to the extension waiting for the obscuration to clear and did not notice that his loader had dropped the fire/safe handle into the safe position just as Raez pulled the triggers. The ejected stub base from the first round was firmly stuck under the fallen deflector tray. As precious seconds ticked away, Moore opened the ammo door and extracted the next sabot round for loading. Johnson yelled "Target, far tank," as the dust cleared and the near tank disappeared. Moore turned his body, his hands full of 120-mm cartridge, and attempted to load the round. It was only then that he noticed the stuck stub base. "aft cap! aft cap!" Moore yelled, but not until 10 seconds had passed. The crew's concentration was broken.

Many a crew has been pulled off the course road at range 117 for multiple "aft cap" announcements. These crews are told to report to their maintenance teams to have their stub base deflector cables checked for the proper adjustment. After doing so, they return to the firing order and attempt to complete their run, only to encounter more "aft caps." Moving the lever to the safe position before the breech has completed recoil and counter-recoil causes the stub base deflector to fall prematurely, thus catching the stub base underneath the tray before it clears the breech. This is a timing and technique problem that is prevalent among loaders. Most loaders instantly turn their backs to the breech when the gun is fired to face the ammo compartment while at the same time they put the fire/safe lever to safe. They do not see the stuck stub base until after they have removed the next round from the ready rack. Train your loaders to face the breech while opening the ammo door. They must be able to see the aft cap clear the breech before placing the fire/safe lever to safe.

To train this technique, place a block of wood approximately the same size as a stub base under the tray during your loading exercises. If your loader drops the handle but fails to notice the "aft cap" he needs to work on his technique. Vary the number of times you place the block under the tray. Never train loading technique with the breech open and

the stub base deflector in the down position. We always go into combat "battlecarried," so every round fired will leave the tray in the "up" position. Train the way you will fight!

After clearing the stuck stub base, Johnson's crew completed the engagement, but not before his tank short-lined the next round, another "aft cap," and finally a "target, cease fire," for a total score of 61 points. OK," people, lets shake that one off and get it together for the rest of the run," Johnson said, as his driver pulled into BP 2 for the next engagement. "B32, this is C92, close your ballistic doors, battlecarry sabot, and give me a ready report, over." "Raez, close the doors and get ready for the battlesight engagement," Johnson said. He went through the whole sequence of events and possible actions with the crew. He wanted to make sure this one went off smooth. He received the crew report and announced "REDCON 1" to C92.

Scanning out of the CWS sight, Johnson spotted the moving tank on the left of the range, moving right, and the stationary tank near the right range limit marker. Grabbing the TC's override, he slid the turret to the left and yelled, "Gunner, battlesight, two tanks, stationary tank. Driver move out, gunner take over." Wilson released the brake and quickly brought the tank up the ramp to a hull-down position. "Gun tube clear, driver stop!" yelled Raez as the GAS reticle slid across the target. "Identified!" Raez said, and Johnson released the override. "Up, fire, and on the way" were heard in quick succession in the tower.

As soon as the tank fired, a cloud of dust surrounded the position. "Target obscured, target obscured," Johnson screamed. Wilson immediately shifted into reverse and screamed down the ramp into a turret-down position. At the same time Wilson took off, SPC Moore was trying to extract the next round of sabot to load. The quick takeoff and short stop knocked him off balance preventing him from extracting the round cleanly.

Once the tank stopped, he again struggled with the cartridge in his hands as he tried to load. Johnson announced, "Target, moving tank, driver move out, gunner take over!" Wilson raced up the ramp again, and again Moore wasn't set. With the sabot round in his hands, he was thrown into the turret ring, smashing his hand between the base of the round and the bulkhead wall separating the ammo compartments. With the pain shooting up his arm, Moore threw his weight forward, placed the round on the tray, flicked his arm, and the round rattled halfway into the chamber and stopped. The tank was exposed in the hull-down for more than 15 seconds before Moore finally announced, "Up!" Again, "fire" and "on the way" were split seconds apart, and the tank shuddered when Raez pulled the triggers. Johnson saw the target drop, announced "Target, cease fire." Johnson slumped into the TC's seat. "Oh for two, and eight more to go," Johnson thought, and he wondered why the tanker gods were punishing him. He wasn't a happy camper.

A lack of technique and practice with SSG Johnsons' crew caused that engagement to go down the tubes. Loaders come in all sizes and shapes, and the manner in which they load, whether standing or sitting, must be taught. Each has its advantages and disadvantages. The stability advantage of the sitting technique is offset by the extra upper body strength needed to handle the round. The standing technique offers more leverage for the loader but he has to deal with a small space in which to rotate the round when turning to face the breech. Most of all, he has to be agile!

If your loader insists on standing, make sure to conduct your loading exercises from a moving tank that stops at undetermined moments during the loading procedure. If your loader constantly loses his balance, causing him to miss the eight-second standard for loading a 120-mm cartridge, try the sitting technique. Make sure he adjusts the seat for height and distance from the ammo door and start practicing. Also, nothing can replace practice with the entire crew! As I said before, the crew must develop its own rhythm. Good tank commanders gauge the speed in which they issue fire commands and the command "fire" by the abilities of their crews to respond. The commands and actions of good crews happen like clockwork because each member knows the others' capabilities. Fire commands are designed to reduce confusion and coordinate the actions of the crew. All crew actions must be regulated by the capabilities of the weakest crew member. If they are not, crew coordination will be sporadic at best.

Cross train all your crew members as loaders. You know as well as I that no one is exempt from this underestimated position.

SFC Michael F. Capobianco has been an M2 master gunner since June of 1985. His previous assignments include company master gunner and tank commander, A Company, 2d Battalion 67th Armor, 2d Brigade, 2AD (1983-1986); company master gunner and platoon sergeant A Co, 2d Battalion, 67th Armor, 3d Brigade, 3AD (1986-1989). He is presently assigned as battalion master gunner, 2-67 Armor.

The Stories Are True:
Your Head Will Not Stop Main Gun Recoil

by First Lieutenant Larry E. Johnson

I doubt that any tanker will ever forget the first time he entered a tank: an old, grizzly sergeant standing there, combat patch on his right sleeve, CIB above his left pocket. With a collapsible pointer, or maybe just a branch from the nearest tree, he points to several features of the vehicle, and describes how this feature works, or how that one is meant to work. Then, he looks you squarely in the eye and says, "Whatever you do, boy, don't EVER get caught behind this sucker when it fires, because it will do some nasty things to you. I once knew a guy..." And he proceeds to tell you all the nasty things a breechblock can do to you if you are caught in the path of recoil.

Hopefully, this article will provide readers with "lessons learned" about that subject, and provide insights into how not to ever let an event like this happen again.

On July 24, 1990, I experienced and survived such an event. My cavalry troop had been familiarizing students with the M1 Abrams tank. After watching a live firepower demonstration, the students received a safety briefing, and went by pairs to tanks on the firing line, while other students went to weapons familiarization classes. Each tank commander on the line used a set of pre-prepared "cue cards" that described outside features of the tank, progressively moved the TC and his new crew inside the vehicle. Once inside, each student was taken carefully through the different steps required to safely arm and fire two rounds of 105-mm HEAT-T, and 50 rounds of both M240 and .50 caliber machine gun ammunition.

My third group of students that morning included an allied student. After introducing myself, I added another safety measure by telling the students that they would not touch anything on the tank until I instructed them to do so, especially any of the gunner's controls or switches. Again, as I had done previously with each group, I cautioned this new crew about safety, and the importance of asking questions about **anything** they did not understand. As much as possible, I demonstrated the different functions of the turret from the commander's station.

As we carefully progressed through the different steps of arming the main gun, I noticed that the allied student, whom I had placed in the gunner's seat, seemed to have slight difficulty understanding terms such as "laser rangefinder," "thermal imaging system," and other terms familiar to tankers. However, once I explained or demonstrated the function of a certain item, both students seemed able to catch on quickly. As expected, there were several times, however, when I had to repeat myself or re-demonstrate a function to one or the other student as a means of helping them understand the different systems.

By now, we have the main gun prepared to fire, with the GPS laid center of mass on the target. Before firing, I repositioned the loader's body position, and told the gunner to again determine the range to the target, using the thumb buttons on the gunner's power control handles, and repeat that range back to me as we had done several times before. After ensuring the loader was away from the path of recoil, I noticed the gunner still had not repeated the distance to the target yet; he was hesitating because he could not remember if he was to depress the palm switches as he depressed the laser thumb button.

Believing that I was not in the path of recoil myself, I leaned slightly forward and a bit to my left to see what the trouble was, when the student depressed both the palm switches and the trigger, firing the main gun. The right side of the gun recoiled into the left side of my face, striking almost in the center along my nose. I was immediately knocked unconscious and thrown to the rear of the turret, my CVC helmet thrown off somewhere in the process. I finally regained consciousness in a semi-upright sitting position in the commander's seat with a long cut over my left eye.

Quick reactions by both students and my driver resulted in a cease fire freeze, and my body was extracted from the turret and placed on the back deck. In just a short time, I was flown by MEDEVAC to the post hospital. As you might expect, there were several injuries, such as a skull fracture, broken teeth, and spinal fluid leakage, along with other injuries. I remember nothing about being hit and had no idea what had happened until about two hours later, when I discovered that I was in a civilian hospital.

There are many lessons to be learned from this experience, and I offer those I feel are most important. In fact, the first lesson is actually a "lesson confirmed." No crewmember should ever place ANY part of his

body behind the main gun once it has been armed, nor should he assume that any portion of his body is away from the path of recoil. Although I have been a tanker for eight years, I made the mistake of not having the loader and gunner disarm the gun, and incorrectly assumed my body was not in the path of recoil.

Perhaps the next lesson should be that I never should have placed the allied student in the gunner's seat. If I had placed him in the loader's position upon entering the tank, then it is very possible that he would have been more familiar with the terms used for firing, and may have felt more comfortable once it became his turn to fire the main gun. Even a short bit of familiarization is better than no familiarization.

Another lesson of value is that I was wearing a Kevlar-shelled CVC helmet when I was hit (see photo). The microphone on my normal helmet had malfunctioned earlier that morning and I traded it for another CVC, which just happened to have a Kevlar shell. When the breech recoiled into my head and face, the blow was spread over my head rather than through one central point. I can say here that in the areas where there was no protection from the CVC (such as my face), there were several injuries. I strongly believe this step alone saved my life. As the photo at left shows, the CVC is still very much usable, having suffered a dent about 1/8" deep and four inches long.

Training a crew to react quickly is always important. Although I had been with these crewmen for just about twenty minutes, they were smart enough to realize that this incident was a true emergency. The student loader immediately called the tower, saying that there was a major problem on our tank. In addition, my permanently assigned driver, listening over the intercom, reacted so quickly that he shut the tank down instantly, rushed to the commander's hatch, and assisted in removing me from the tank.

Another lesson to be learned here is that ANY student who is about to participate in a live-fire exercise should first go through some form of hands-on training, such as UCOFT or a motor pool "Round Robin," where he can actually place his hands on the controls and see how the turret traverses, how the breech operates, and so on. Doing so would cut down on the number of training accidents. An addition to this lesson is that each student should also be allowed to experience the firing of the main gun **before** actually firing it himself. One way to accomplish this is to have the students arm the gun as usual, but not let the student gunner place his hands on the gunner's controls.

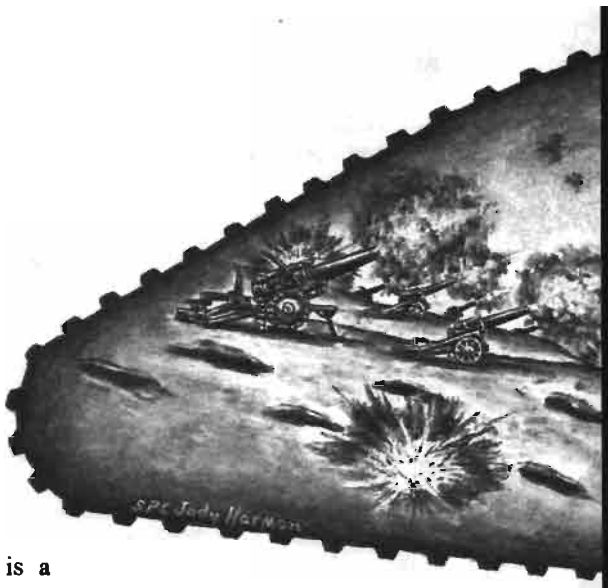
The only items on which the student gunner would place his hands would be the magnification lever for the main gun, the ammo select switch, and the main gun select switch. The TC, explaining each step along the way to firing, would then lase and fire the weapon from his position. While this step alone can never ensure complete safety, it will still add a measure of respect for what the main gun can do from inside the tank. Anyone who experiences the rocking and the recoil of the main gun as it fires certainly keeps a wary eye toward the recoil path after that. I know I will from now on. Still, mistakes will happen.

I suppose there are many more lessons to be learned from this experience, and I'm sure I've covered only a small portion here. My hope is that it never happens again to anyone. Tank crews must always be conscious about checking each member of the crew for safety hazards, and continually keep an alert eye for ANYTHING that can cause an accident. Most of all, quick reaction, knowledge of safety procedures, and intercrew communication can prevent not only a breech accident, but many other accidents as well. From the day we become tankers, we are warned that the breech can do many bad things to us if we're caught behind it: I'm living proof that the stories are true.

First Lieutenant Larry E. Johnson is a 1988 Distinguished Military Graduate of the College of William and Mary in Virginia, where he majored in psychology and minored in American history. A prior enlisted soldier having served in 2-70 Armor, Ft. Stewart, Ga., 1-64 Armor, FRG, and 4th Battalion, 1st Armor Training Brigade, Ft. Knox, he has served as a tank commander, platoon sergeant, S3 assistant operations, and drill sergeant. A graduate of the Aviation Officer's Basic Course, Armor Officer Basic Course, and the Scout Platoon Leader's Course, he is currently assigned as an M1 platoon leader with C Company, Task Force 1-10 Cavalry, Ft. Knox.

Major General J.F.C. Fuller and the Problem of Military Movement

by Brian Holden Reid



In F. Scott Fitzgerald's novel, *The Beautiful and Damned,* can be found a character called Captain Dunning, a very reliable and sound officer who prided himself that, within half an hour of meeting a man, he could slot him into a certain category. Among those categories which excited his disapproval were "smart fellow," "theoriser," "poet," and "worthless," the latter presumably being an amalgam of all the previous three categories. I think you will immediately realize that J.F.C. Fuller, whom Sir Basil Liddell Hart in his monumental history, *The Tanks,* dubbed, "The first who ever made the heads of continental armies look to England for professional guidance," fits into all these categories except the last. That far from being "worthless," it is increasingly being realized that the corpus of Fuller's writing, 46 books in all (the last appearing in Fuller's 87th year, 1965), disparate, eclectic, and poorly integrated though it frequently is, offers us a sustained and penetrating analysis of the conduct of war, not only of the highest intellectual quality, but something rarer — of considerable percipience.

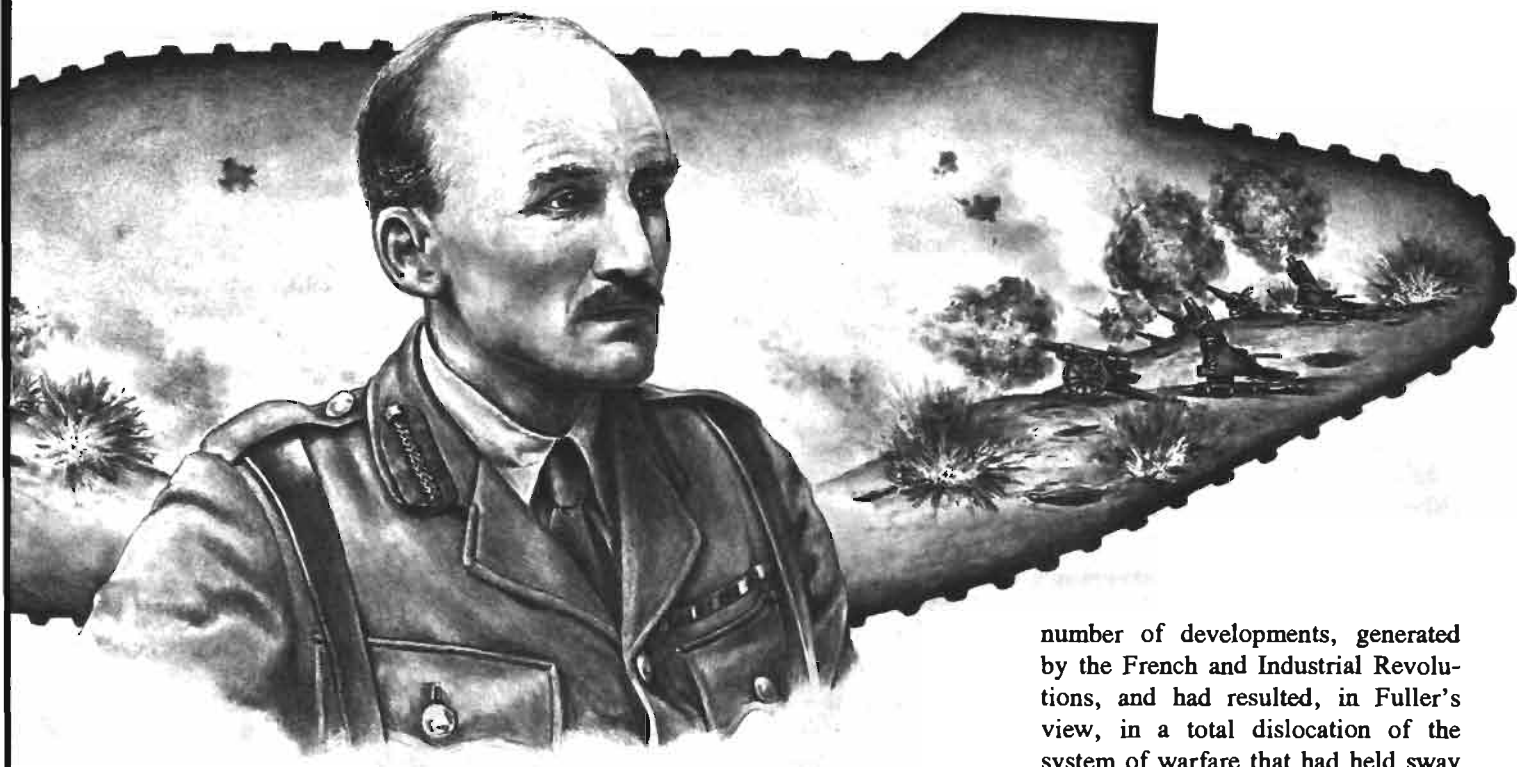
This is not to suggest that Fuller was always right; quite the contrary, he was sometimes wrong. But he was never less than interesting, even when he was wrong, and that is a very great virtue in a military writer, all too rare today. In considering the issues which confront the British Army (and others) in the 1980s and 1990s, of which I am privileged to have a small part as the Resident Historian at the Staff College, I am struck by how comparable the operational problems are today to those that Fuller was discussing in his brilliant and iconoclastic way more than 60 years ago.

A character in an E. M. Forster novel somewhere said that if people disagreed with the established order and the prevailing way of doing things, they could at least have the good manners to keep their dissent to themselves. Fuller thrust his ideas about armored warfare to the very forefront of military debate. He did not have the good manners to keep his views to himself, and advanced them in such a fearless (and it must be said also, tactless) manner, as to cost him the chance to go to the very top of the Army.

He was dedicated to the cause of truth, as he understood it. In March 1923, he wrote to his friend, Liddell Hart, "It amuses me to state what I believe to be true, but whether my audience understands me or not I do not much care, because truth in the end wins through. I would rather possess one real sovereign than 1,000 counterfeit ones."[2] It is a very remarkable — and rare man — who places a commitment to truth above his own advancement, in the army or anywhere else.

My subject is a very broad one, in my book *J.F.C. Fuller: Military Thinker* and elsewhere, I have discussed in some detail the precise nature of Fuller's predictions about the future of armored warfare. In this essay I would like to chart a slightly different course. I wish to pursue the theme of Fuller's ideas about military movement, or mobility, and how these developed into a refined theory of maneuver warfare. This will permit a discussion of Fuller's more controversial ideas about the military structure and methods of command needed by modern armies when employing this style of warfare.

Maneuver warfare is a subject that exercises the thoughts of the American and British Armies at the moment, and I hope that this discussion will be of some interest to those



who are currently grappling with this problem.

I should add that if Fuller's work has an undertow, an unspoken assumption, it is that the British Army (and the American Army also) is not very good at maneuver warfare.

Not that the British Army lacks the moral qualities necessary for maneuver warfare; such a charge would be, was, and is ridiculous. The British Army throughout its long history has displayed abundant evidence of dash, courage, drive, and an instinctive "feel" for the pulse of battle. If anything, as the Duke of Wellington frequently complained — and Auchinleck might have, had he shared the Duke's choleric disposition — the British Army has shown too much dash. But a close scrutiny at the recent historical record will show, I contend, that the British Army has not been very good at organizing movement on the battlefield, rather a different thing than simply showing a flair for it. Fuller considered that the British Army was too prone to thinking in compartments, and failed to integrate defensive elements into an offensive plan. And the American Army, although highly praised in his books on General Grant for its skill at maneuver, was too prone in the Second World War to rely on overwhelming the enemy with materiel, a style of warfare which he dismissed as "ironmongery."

In Fuller's view, the aim of armed forces was to impose their will on the enemy. But an army fought in accordance with three defined tactical functions: To move, to hit, and to guard. These were supplemented by three others derived from the prime three, to find, to hold, and to pursue (or destroy). An army's ability to move underlays these functions. The weapons deployed fulfilled the object of the functions.

For all officers of Fuller's generation, the First World War (1914-18) was the supreme operational object lesson, a diagnosis of which cemented the foundations of his vision of the future of war. The Great War represented the culmination of a number of developments, generated by the French and Industrial Revolutions, and had resulted, in Fuller's view, in a total dislocation of the system of warfare that had held sway since the end of the Middle Ages. We must, therefore, understand that Fuller's technical operational analyses were inspired by a grand historical vision, which sought to relate military developments in the narrowest sense to the progress — in the technological, political, social, cultural and ideological spheres — of Western civilization as a whole.

This is a very ambitious aim, and was, for obvious reasons, imperfectly attained, but was most nearly realized in his three-volume study, *The Decisive Battles of the Western World (1954-6)*, the greatest book ever written by an Englishman on the history of war.

The system developed during the 16th century saw the tactical functions of an army attained by weapons combining projectiles (bullets and cannon balls) with shock (those that need to be driven home by the propelled force of their holders (swords, pikes, lances, and later, the bayonet). The distance between the two armies that had to be traversed before an advance with shock

weapons could be driven home, and the capacity of a defending army to destroy a charge of shock weapons with projectile weapons, therefore became a crucial factor.

Before the Industrial Revolution, this form of warfare was refined by Frederick the Great and Napoleon. Light forces found the enemy; heavy infantry held him by pinning him to his position; and cavalry, by charging the flank, destroyed his cohesion and attacked the decisive point — the enemy's rear. The important mobile element was supplied by cavalry, and it was this arm that delivered the *coup de grace*. But even by Napoleon's day, the artillery was gaining in importance. Napoleon's comment, "It is with artillery that war is made," was frequently quoted by Fuller. Once the quantity of projectiles thrown at an enemy became so great that he could not close with shock weapons and his mobile element could not charge, then fighting decisive battles became all but impossible.

The productive capacity generated by the Industrial Revolution was so immense that armies were forced to entrench to escape the vast quantity of projectiles fired at them. This rendered armies immobile. A tendency toward attrition was accentuated by important political and social developments. The French Revolution had witnessed the introduction of conscription on a large scale. By 1914, all the major powers, with the exception of Great Britain and the United States, deployed conscript armies with great reserves of manpower, which could answer the call to the colors in moments of crisis. The growth of the military power and productive capacity of the nation state by 1914, and the strategic flexibility, which accrued from the construction of railways, contributed to a massive increase in the size of armies. "As democracy, in the form of one man one vote, was the final expression of the French Revolution," wrote Fuller, "so was that of the nation in arms, one man, one musket, the military expression of this same upheaval."[3]

The fundamental problem, however, as Fuller was quick to point out, was that the many millions of soldiers fielded by 1914 did not handle muskets, but repeating rifles, with refinements on the percussion cap, the conoidal bullet, and smokeless powders; they were supported by machine guns ("the concentrated essence of infantry" in Fuller's view) and quick-firing artillery. This avalanche of projectiles, apparent since the American Civil War (1861-65), the result of more men firing more bullets and shells more efficiently, but commanded less efficiently, as great armies were so much more difficult to command, so much more inflexible than small armies, dislocated the decisive battle, reduced mobility, and led to a huge stalemate.

What was the reaction of European military staffs to this major development, which had more than a little bearing on their ability to carry out the intricate and grandiose war plans on which they had all been laboring for many years? In his book, *The Sources of Military Doctrine* (1984), Barry R. Posen argues persuasively that new technology is adapted to fit the demands of existing doctrine, rather than vice versa, and that doctrinal innovation to fully exploit new technology is very rare, unless it can be carried out in wartime.[4] The response of European armies was to emphasize morale factors to the detriment of technological, to argue that sheer courage, national pride, and determination would be sufficient to outweigh massive improvements in firepower. The infantry regulations of 1899, fundamentally unchanged until 1914, declared:

When the decision to assault originates from the commanders in the rear, notice thereof is given by sounding the signal "fix bayonets"....As soon as the leading line is to form for the assault, all the trumpeters sound the signal "forward double time," all the drummers beat their drums, and all parts of the force throw themselves with the greatest determination upon the enemy..... When immediately in front of the enemy, the men should charge with bayonet and, with a cheer, penetrate the position.[5]

Many other more extreme examples of this "cult of the offensive" appeared in French military writings of this period. This kind of argument earned Fuller's contempt for two main reasons; first, it exalted morale factors beyond reason and thus made excessive demands on morale; and second, it utterly distorted the relationship between the offensive and the defensive, which had already been strained by technological improvement. It was not Fuller's contention that morale factors in war were unimportant, quite the contrary. But in any "Guts versus Guns" equation, it was obvious who would win, because courage offers little protection against machine gun bullets.

Such factors — the morale and the technological — had to be placed in their proper relationship with one another and not isolated and exaggerated. The Great War, with its long entrenched lines, massive bloody battles, and resultant chaos and revolution was a massive distortion of the Napoleonic military system and, thus, had to be modified.

What then was Fuller's solution? It was perfectly simple, as are most profound truths, and consistently stated throughout his long and productive life: that the utility of the decisive battle could be restored if technological change could be har-

monized with tactical doctrine to secure the fruits of increased mobility and an increased velocity of war. The faster armies move, the more they can achieve, and the more the enemy can be demoralized so that he is unable to mount a response commensurate with the blow delivered.

There is, therefore, a relationship between gaining surprise and winning a rapid and decisive victory, comparable with those of Napoleon, and the novelty of the weapons fielded; technological surprise was thus of crucial importance. It is, of course, in this context that armored forces would have a profound influence on the conduct of war. Because they are protected by armor plate and could advance in the face of a barrage of projectiles, they could cross the "fire zone" between entrenched lines and attack the enemy's rear, as had horsed cavalry in the days of Napoleon.

The tank would bring about a massive increase in the velocity of war on land. It was not the only weapon that would contribute to this change, there were two others, aircraft and chemical weapons, with which the tank would operate in the closest harmony. Of course, Fuller was wrong in predicting that chemical weapons would be used "without doubt" in the next war, that of 1939-45, because for various reasons they were not, but a reminder is not required as to what a terrible threat they remain.[6]

Fuller regarded the tank, like other technological developments, as the product of the prevailing social and technological trends of its parent society. It represented the next phase of the Industrial Revolution based on the internal combustion engine.

The more mechanized a society became, the more highly mechanized became its armies. The arms race would, therefore, become more accentuated in warfare on land. Thus, if the weapons on one side became so sophisticated and mechanized, while the other side failed to mechanize, then it was possible that the enemy could be surrounded and annihilated without the armored force having to close the gap between the armies and cross the fire zone. Indeed, the possibility existed to totally defeat an enemy without sustaining a single casualty. The three tactical functions to move, to hit, and to guard could be realized to the fullest.

The tank, and its attendant vehicles (Fuller tended to be rather vague about the precise definition of what constituted "a tank") represented in Fuller's view nothing less than a revolution in warfare because it combined in itself the capacity to fulfil those tactical functions — movement, protection (to guard) and offensive power (to hit). The tank could move across country, and could carry with it (so Fuller held) its logistical requirements. It would reinforce a tendency in warfare on land to evolve along the same course as navies.

That is to say, the fighting power would be increasingly concentrated in capital-intensive weapons platforms. This tendency has still to work itself out, in my opinion, but I think the introduction of armored personnel carriers and fighting vehicles such as the U.S. "Bradley" and the British "Warrior" are a definite further step in this evolutionary direction — of having armored troops (the tactical equivalent of the old cavalry) and mounted infantry.

But whichever analogy is used, the contest between projectile and armor, as in naval warfare, is of fundamental importance.

How would these weapons actually fight? The combination of offensive and protective power, and the capacity to move, lay at the heart of the tank's fighting strength. Fuller made these elements the basis of his tactical and operational system of maneuver warfare. It must also be emphasized that "mobility" should not be confused with "maneuver." A capacity to move does not in itself lend an army the capacity to fight a maneuver battle. This is a blend of the offensive, protective, and the mobile.[7] Fuller was of the opinion that the defensive was just as important an element in the maneuver battle as the offensive. In a book of essays called *On Future Warfare* (1928), Fuller wrote:

That the decisive point of attack is the rear of the enemy's army and that to hit this rear we want two forces just as the boxer wants two fists; that all attacks should, when possible, be dual in nature, since it is more difficult to watch two fists than one fist, because whilst the right one is being watched the left may suddenly hit out.[8]

To slightly vary the metaphor, these two fists can be compared to the sword and shield, the offensive and the defensive, with successful generalship a compound of audacity and caution. Armored warfare, if it is to be successfully waged, must be based on a judicious defensive-offensive. To conceive of military operations in terms of "the attack," "defense," and so on was fatal. They had to be seen as part of a conceptual whole.

Generally speaking, a commander must attack because without attacking he can neither hit nor hold, and seldom can he maneuver; but in any one of these cases he need not necessarily attack *au fond* [as in 1914]. To await an enemy [however] without attacking is frequently futile, and to attempt to maneuver without first doing so is often to risk annihilation.

Such is Fuller's view of the relationship between the offensive,

defensive, and maneuver — the organization of movement on the battlefield. In his conception, these elements are not only inter-related but complementary. It was, and is, a mistake to believe that the defensive was primarily concerned with holding ground or resisting attacks, "for it is just as much part and parcel of every forward movement as every holding or retrograde one."[9]

Well, this is all very well in theory, but how can this be achieved in practice? Fuller was a very practical as well as thoughtful soldier. He had wide experience as a planner, and had been the original inspiration behind the first real tank battle at Cambrai in November 1917. He was so confident in the value of his experience, that he was sufficiently audacious to take the *Field Service Regulations,* and publish his own commentary on it called *Lectures on Field Service Regulations II,* a book written in just 14 days.

Some general officers in those days thought this somewhat impertinent. But this book is a masterly operational commentary, which thoroughly repays careful study, and it does not deserve to be overshadowed by the more famous *Lectures on FSR III,* which deals more specifically with operations between mechanized forces.

In Fuller's opinion, the transport revolution of the 19th century, especially the development of the railways, had encouraged the movement of increasing numbers of men to the battlefield, but it had done nothing to allow them to fight battles on the move. The old problem of how to close with the enemy, but this time in the face of an immensely increasing barrage of projectiles, still had to be solved.

"In all the great artillery battles of 1916-17," Fuller wrote, "the railways enabled a million men to be assembled and fed, but once the battle area was entered, the roads having been destroyed by the artillery bombardments, rendered this feeding so difficult, that even had the enemy packed up and retired a hundred miles, no sustained advance could have taken place until the railheads had been pushed forward and the roads repaired."

The tank made movement across rough country, and thus harmonizing movement with strategy and tactics, a realistic possibility. Previous advances in motorization had done little to speed up the process of fighting, because soldiers had to dismount to fight; the race to win the battlefield was governed more by speed of mobilization than by a physical capacity to reach it overland, because this was determined by muscle power, which remained a constant among all armies. By permitting an army not only to advance but fight simultaneously, so that fighting battles and strategic maneuvers were to an unprecedented degree fused into one interdivisible activity, the tank drastically changed the relationship between mobility and military operations.[10]

This was possible because the tank allowed the development of protected movement, which armies had lacked during the Great War. The tank offered the renewed possibility of striking at flanks and thus at the rear of the enemy's army. The opportunity presented itself to paralyze the enemy psychologically, because it is the disintegration of his organization, and especially his command, which is the object of the maneuver battle, and not just the killing of his soldiers.

As Fuller wrote, "you may surprise an enemy with his eyes shut or open. In the first case you do something he does not expect, in the second something he is unable to meet." [That is, the fielding of new weapons.] The main object of attaining surprise is gaining time, and time is secured by mobility, and in part the stability of the offensive plan is sustained by air superiority.

It cannot be emphasized too strongly how important military time is in this equation. Time was of the essence: "its loss," Fuller wrote, "can seldom be made good; in fact of all losses it is the most difficult to compensate." The faster an army moved, the more it can achieve in a shorter period of time.

If an army, he continued, can move twice as fast as its adversary, and is so strongly protected that it loses but one man to his two, then it will have twice as much time at its disposal, and, in comparison to its enemy's strength, its own will be double the muster role.

Secure but rapid movement was, therefore, the aim of the maneuver battle, for it weakened the enemy's capacity to resist in direct proportion to the momentum of the advance, as exemplified during the breakthrough at Sedan in May 1940.[11] Once the enemy's forces were routed, the pursuit, the act of annihilation, comparable with the battles of Frederick the Great and Napoleon, should begin. Fuller envisaged this as a new battle, which should aim at heading off the enemy's retreat by parallel movement.

But rapid movement did not mean that the protective element should be downplayed, as it had been before 1914; "today" he wrote, "there are so many bullets flying about on the battlefield, that caution has become a high virtue, as high as courage itself. Few things are so expensive as a shattered attack." Nevertheless, caution must be linked with audacity in a commanding general's plan.[12]

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I would like to conclude this necessarily brief survey of Fuller's views on mobile warfare with a number of his reflections on how thinking and implementing this style of warfare can be facilitated. First, he argued that the entire operation should be conceived as an intellectual whole, and not viewed as a string of miscellaneous general engagements that have no relationship with one another. Each battle should be regarded as a stepping stone to the successful conclusion of the war and should make a distinct contribution to the overall plan.

Second, that command should be flexible. Commanders, in other words, should command. In a shrewd passage, he commented that:

The common deficits in command are lack of balance, sudden elation or depression, fear of what the enemy is going to do in place of concentrating upon what you are going to do to him; setting tasks which are outside the ability of the troops to accomplish; over caution and waste of time; calling conferences in order to pick the brains of subordinates and lack of originality which often leads to doing something which the enemy expects in place of what he does not look for.[13]

Fuller particularly disliked conferences. They should serve as a means of explaining an idea and issuing responsibilities, but not as a means of picking the brains of subordinates "or kicking an idea about."

Third, plans should be flexible. They should embrace a conceptual agility, so that action may be adapted to the appropriate circumstances. The plan should be simple, and if the order adopted enables you to hold, maneuver and hit, you will not go far wrong. Hold strength and hit at weakness. To pin the enemy's front down and hit him in rear, or flank, when he least expects it, and with a force superior to the one you are likely to meet, and place the reserves in position with references to these two ideas.[14]

The plan should enshrine mobility of thought and not elaborate overpreparation, which cramps initiative and tends to lead to tactics "by the book" and to a "routine." The temptation, too often shown in the Western Desert in 1941-42 — especially in the Battle of Gazala — of wanting to protect everything, and consequently of being weak and dispersed everywhere should be avoided. "Do not let us bother about holding ground or conquering ground — let us organize movement; this is the crucial problem." Taken in moderation, this axiom is a sensible view of the nature of the maneuver battle.[15]

Finally, we must remember that the object of military operations is the destruction of the enemy's weapon power, his capacity to fulfill the tactical functions, which is the prime object of the maneuver battle. His organization must be shattered.

This consideration is all the more important if the enemy outnumbers us. To become involved in a killing match with an enemy who outnumbers us, is not only going to doom the weaker side to defeat, but is the antithesis of that stream of thought, as exemplified in the writings of Major General J.F.C. Fuller, which has done so much to develop the idea of the maneuver battle.

Footnotes

[1]B.H. Liddell Hart, *The Tanks* (London, 1959), I, p.221.

[2]Fuller to Liddell Hart, 27 March 1923, Liddell Hart Papers 1/302/39.

[3]Quoted in Brian Holden Reid, *J.F.C. Fuller: Military Thinker* (London, 1987), p. 141.

[4]Barry, R. Posen, *The Sources of Military Doctrine* (Cornell University Press, 1984), pp. 55, 226.

[5]Tim Travers, *The Killing Ground* (London, 1987), pp. 43-44, 53-5, 65-6; John Ellis, *The Social History of the Machine Gun* (London, 1987 edn), p.54.

[6]Brian Holden Reid, "Gas Warfare: The Perils of Prediction," David Carlton and Carl Schaerf (eds) *Reassessing Arms Control* (London, 1985).

[7]This is an important point emphasized by Russell F. Weigley, *Eisenhower's Lieutenants* (London, 1981), p. 172.

[8]J.F.C. Fuller, *On Future Warfare* (London, 1928), p. 80.

[9]Ibid, p. 85; Reid, *J.F.C. Fuller,* p. 67.

[10]J.F.C. Fuller, *Lectures on FSRII* (London, 1931), pp 160-2.

[11]Ibid, p. 66-8.

[12]Ibid, p. 82.

[13]Ibid, pp. 6, 41, 165.

[14]*On Future Warfare*, p. 205.

[15]Ibid, p. 293.

The author is grateful to the Trustees of the Liddell Hart Centre for Military Archives for permission to quote from the Liddell Hart Papers.

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Designing a Live-Fire Exercise For Scout Platoons

by Major Tim Edinger

Historically, live-fire exercises (LFXs) are among the rare training events that give combat units a chance to integrate the fires of their various weapon systems, using full-service ammunition, often in a combined arms setting. LFXs have an element of realism absent from exercises conducted with the Multiple Integrated Laser Engagement System (MILES). LFXs give soldiers a chance to see the effects and limitations of their organic weapons, indirect fires, and direct fires from supporting units.

Typically, the focus of an LFX is at the company/team level, appropriate for tank or infantry battalions and armored cavalry regiments. But for divisional cavalry squadrons and scouts in tank and infantry units, a platoon focus is more appropriate because the scout platoon often operates independently on the battlefield; its primary missions are reconnaissance and screening in support of its parent unit.

During screening operations, the scout platoon is limited in its ability to destroy or repel enemy reconnaissance units. During counterreconnaissance, the scouts will acquire and maintain contact with the enemy, but cannot destroy the enemy counter-reconnaissance elements without infantry or armor augmentation. So it is especially important for scout platoons and their leaders to know how to call for and use supporting direct and indirect fires. Just as important is that scout platoon leaders understand the weapons effects of various indirect fires and their limitations in terms of accuracy and time on target. It is not enough to read about it; the platoons must experience it to appreciate the complexity of integrating three or four weapon systems and truly creating a synergistic effect of all fires.

There is plenty of information available on armor or infantry company/team LFXs, but little on how to conduct a scout platoon LFX. What I'll describe here is a menu; obviously, existing range facilities, differences in scout platoon weapons and equipment, and the availability of other combat and combat support units will call for variations. This example is based on the recent experiences of a motorized cavalry squadron while training at Yakima Firing Center, Washington.

The first step in the development of an effective LFX is to determine training objectives. Our LFX was intended to challenge our scout platoons and their leaders with integrating fire support from their own 4.2-in. mortars and supporting AH-1F attack helicopters while conducting their traditional missions. Leaders were confident that, while the platoon would benefit, the mortars and the attack helicopters would also derive exceptional training value from the integration of their weapons with the scout platoon's scheme of maneuver.

Once training objectives are established, resources had to be forecast and allocated — land, ammunition, personnel, training aids, and time. Land is a key part of the problem.

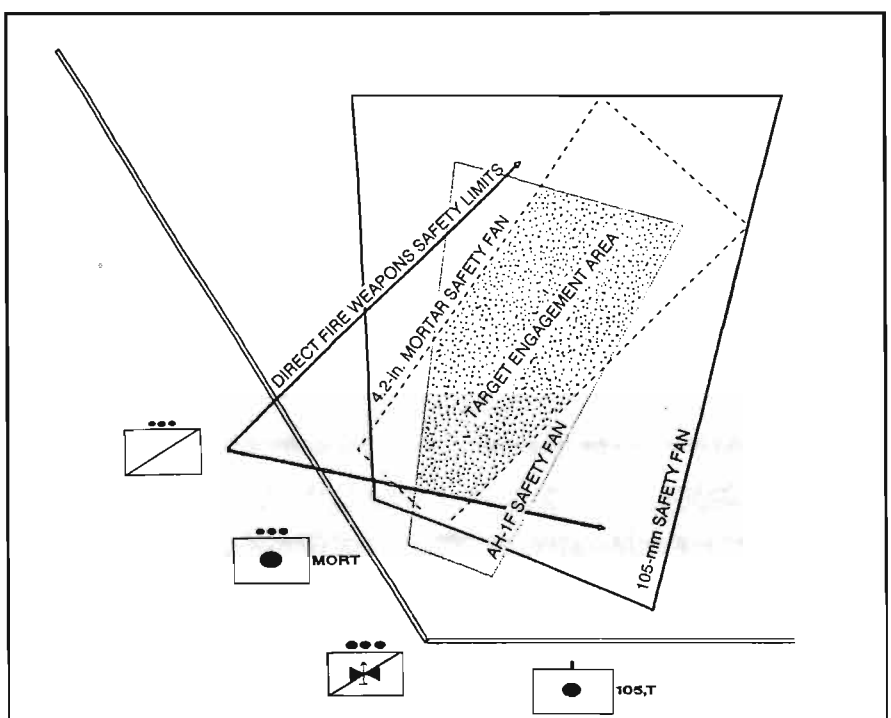


Figure 1. Range Safety Fan Diagram

Because the platoon will use service ammunition, the impact area must be large enough to accommodate safely the range fans of the various weapons. Leaders must identify all weapons that will be fired so that existing firing points, ranges, and OPs that support those weapons can be determined and compared. The goal is to find an area where the safety fans of all weapons converge (see figure 1).

This is no simple task, given most training area firing restrictions. Once the area is identified, examine the adjacent terrain to determine appropriate missions and locations. One natural evolution in mission sequence might be: assembly area operations — tactical road march — forward passage of lines — zone reconnaissance — forward screen — withdrawal. The actual live-fire portion of the exercise is conducted during the screen (see figure 2). FM 25-4 recommends three runs through the exercise — a dry run to review the unit SOP and battle drills, a second run with a reduced amount of ammunition to show the complexities of fire and maneuver coordination, and a third run with full ammunition to reinforce previous training and to build confidence. After each run, conduct after-action reviews (AARs). Considering current funding constraints, many units may not have ammunition nor time to conduct three runs. Two runs may be a luxury, and one run may be the standard. Our run took four hours, not including preparation and AAR time. Naturally, the length of the exercise will depend on the missions conducted (both scope and distance).

Ammunition requirements were not specifically forecast for our LFX. The squadron used residual ammunition from aerial gunnery and mortar live-fire. We also submitted an unforecast request for machine gun ammunition. Ammunition types and amounts will vary from unit to unit.

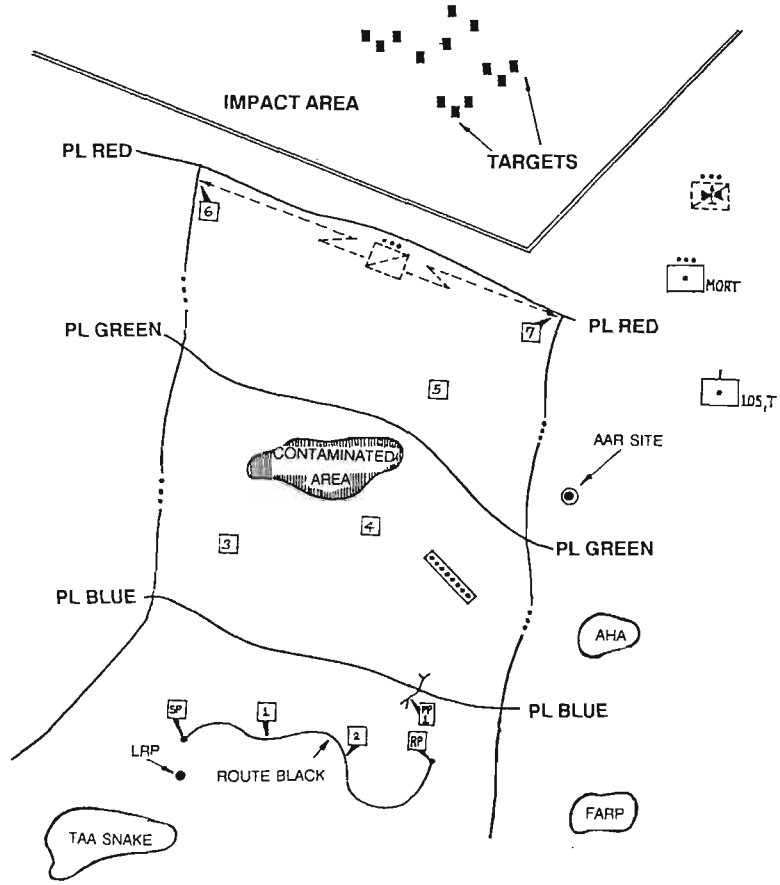


Figure 2. Scout Platoon Mission Graphics

AH-1Fs engaged targets with 2.75-inch rockets and 20-mm ammunition; the mortars fired 4.2-in. HE, and the scouts fired 7.62-mm ball. If possible, the unit should also integrate supporting artillery (105-mm or 155-mm), MK-19 HE, M2 machine guns, and small arms.

Personnel requirements fall into three broad categories: evaluators, controllers, and support personnel. The primary evaluator for the scout platoon LFX should be the troop or company commander. Initially, the platoon leader should receive an operations order (OPORD), and the commander should accompany the platoon leader through his entire troop-leading procedures, observing the platoon leader's issuance of a warning order, his leader's reconnaissance, the development and issuance of his platoon OPORD, rehearsals, and finally, his pre-combat inspections. The squadron should develop the troop OPORD to ensure consistency for all the platoons participating.

Another evaluator should monitor the platoon's ability to maneuver. He should evaluate this from the enemy's perspective. Situated on key terrain that allows complete observation of the entire maneuver box, he can also evaluate communications. We taped traffic on both the platoon and troop nets and used the tapes during the AAR to evaluate reporting procedures, re-port timeliness and accuracy, and as a way to determine if what was reported to be occurring was what actually occurred.

Exercise controllers play a critical role in any LFX. Their numbers vary according to the complexity of the LFX, but their responsibilities should include, as a minimum, the establishment of all ranges and supporting firing points, establishment and main-

tenance of communications with range control personnel, all supporting fires cells, all evaluators, support personnel as required, and the participating scout platoon. The controllers also ensure the unit adheres to the exercise timeline and doesn't violate safety standards.

The number of support personnel needed will also vary, depending on the scope of the LFX. If a unit is conducting a passage of lines, a platoon should be put on the ground to make sure all critical coordination activities are actually conducted, and not just talked about. The supporting platoon leader should provide information concerning the conduct of the passage of lines to the platoon during the AAR. Other support responsibilities include the establishment of an AAR site, the preparation of a logistic resupply point (LRP) for the platoon prior to the tactical road march, any and all supporting indirect or direct firing units, and any opposing forces (OPFOR) included in the scenario. The AAR site should be at a prominent point on the ground, in close proximity to, but not inside, the maneuver box. It should include a platoon laager site nearby, a professional sandtable representing the maneuver box, a map with operational graphics, adequate seating for the platoon and ancillary personnel, and a break area. Cold or hot beverages, as appropriate, helps put the platoon members at ease after the stress of the exercise and facilitates the transition to AAR thoughts and comments. Units can structure the AAR in any effective way. Encourage all members of the platoon to participate. Avoid lectures. One logical approach is to conduct the AAR in the same chronological sequence as the exercise, reviewing each phase of the operation. The Socratic teaching method can work very well at platoon-level AARs. As a minimum, the AAR should cover all battlefield operating systems.

If assembly area procedures or actions at the LRP are being trained and evaluated, coordinate to ensure that Class I, III, IV, and V are available. During this time, the troop or company first sergeant and/or the squadron command sergeant major can observe and provide valuable information to the platoon during the AAR. The mortar platoon, attack helicopter platoon, and any other participating units must be sited, supplied, and controlled throughout the exercise.

Scout platoons often have to call for fire on targets outside the range safety fans of supporting guns. This can lead to leader frustration and a lack of realism during the LFX. Avoid this problem by conducting a preshoot before the LFX to determine the actual limits of all weapons. If possible, position targets only in the firing box. Then develop troop graphics that focus calls for fire in the desired area.

If OPFOR units are stationed in the maneuver box, leaders can train and evaluate the platoon's actions on contact. These units should consist of one or two combat outposts only, thus enabling the platoon to deal with the enemy at his level. The OPFOR leader should be present at the AAR to discuss relevant lessons learned. Chemical and engineer play can also be integrated. Give platoons training mines at the LRP and require them to establish a hasty protective minefield. Integrate smoke or CS into the exercise to train and evaluate the platoon's actions during NBC conditions.

To achieve consistency and absolute control during the LFX a squadron should develop a standard troop OPORD with associated graphics. Also develop a scenario that includes all actions and radio traffic (CUES). This critical document must address each supporting cell and be arranged chronologically. Each unit should literally be told when and what to say and do. An important component of this scenario is a detailed operations schedule which outlines the flow of action in a time-sequenced manner (see figure 3).

Finally, the squadron must develop a standard evaluation checklist for each task or mission to be trained. Derive the checklists directly from 17-57-10-MTP (Scout Platoon Mission Training Plan) or other appropriate documents. The evaluators and the platoons should be aware of the evaluation criteria. Another nice touch is to develop an easy reference master list of all call signs and frequencies to be used by player, support, control, and evaluation personnel.

The OPORD, scenario, call sign/frequency list, and evaluation checklists can be produced on combat acetate to facilitate use and increase durability.

The squadron's controllers should stress fire coordination. Timely fires do not happen by accident. Registration, adjustment of sheaths, refuel and rearm of helicopters, etc., must be anticipated prior to the exercise. If existing hard targets are judged to be inadequate, targets have to be built and sited. If possible, place target arrays in positions that accurately depict the desired enemy formation.

After initial coordination, and after all systems are in place, the squadron should conduct a dry run of all supporting cells to ensure the plan will work. Time the tactical road march rehearsal to make sure no unknown obstacles are present that will confuse the platoon. Inspect the unit to be passed through to ensure it is located correctly, leaders are aware of their mission, and they have a thorough understanding of their responsibilities.

Time	Action	Supporting Activities
H-6:00 HRS	TROOP OPORD ISSUED	PLT LDR ISSUES WARNING ORDER PLT SGT COORDINATES FOR LRP PLT PREPARES FOR PCI
H-5:30 HRS	PLT LDR CONDUCTS LEADER'S RECON	
H-4:45 HRS	PLT OPORD ISSUED	
H-4:15 HRS	MISSION REHEARSALS	ASSEMBLY AREA OPERATIONS
H-1:30 HRS	SPT PLT ESTABLISHES LRP	EVALUATORS ARRIVE AT LRP CONTROLLERS REGISTER SUPPORTING INDIRECT FIRES.
H-1:00 HRS	LRP ACTIONS	
H HOUR	PLT CONDUCTS TACTICAL ROADMARCH	CONTROLLERS POSITION OPFOR AND PASSAGE UNITS
H+0:30 HRS	PLT ARRIVES AT PP#1	PASSAGE UNIT MEETS PLT LDR; ESTABLISHES PASSAGE PROCEDURES
H+0:45 HRS	PLT COMPLETES PASSAGE OF LINES; REPORTS PL BLUE	TRP CDR: X-35, THIS IS D-24; BEGIN RECON IN ZONE FROM PL BLUE TO PL RED.
H+2:00 HRS	PLT REPORTS PL GREEN	TRP CDR: X-35, THIS IS D-24; ENEMY UNITS REPORTED VICINITY CP 17. ESTABLISH SCREEN FROM CP 6 TO CP 7 ASAP. REPORT WHEN SET. 4.2" MORTARS AND ARTY AVAILABLE UPON REQUEST.
H+2:30 HRS		TRP CDR: X-35, THIS IS D-24; COBRA TEAM ENROUTE TO OUR SECTOR IN 10 MINUTES — PREPARE TO EMPLOY.
H+2:45 HRS	PLT SET ON PL RED; PLT IDENTIFIES TARGETS VICINITY TRP 1 AND 2; CALLS FOR INDIRECT FIRES.	COBRA TEAM CONTACTS PLT LDR ON HIS NET AND COORDINATES FOR FIRE MISSIONS; 4.2" MORTARS AND ARTY RESPOND TO CALLS FOR FIRE.
H+3:30 HRS		TRP CDR ORDERS PLT TO WITHDRAW TO PL BLUE AND CONDUCT A REARWARD PASSAGE OF LINES.
H+4:00 HRS	REARWARD PASSAGE OF LINES COMPLETED.	TRP CDR CALLS ENDEX; ORDERS PLT TO MOVE TO AAR SITE. ALL SUPPORT UNIT LEADERS MOVE TO AAR SITE.
H+4:30 HRS	AAR BEGINS	

Figure 3. Flow of Action in Time Sequence

Similarly, inspect any OPFOR elements. Examine minefields or other obstacles to ensure correct location, size, and disposition. Test all radios and ancillary equipment such as tape recorders, television recorders, and monitors. Check all personnel associated with the LRP as well. Confirm aircraft flight times from the forward area refuel/rearm point (FARP) to the aircraft holding area (AHA) to the battle positions. Look at the AAR site during this time. Drive times from ENDEX locations to the AAR site for all participants must be determined so you can adjust AAR times accordingly.

Following the complete dry run, the LFX is prepared for execution. All scout platoons should cycle through the entire exercise. Ideally, platoons from different troops should follow one another during the LFX rotation to allow the troop commander time to prepare for the next iteration.

With a well-planned, rehearsed, and tightly-controlled LFX, each platoon should be thoroughly stressed and tested in a manner MILES training could never hope to achieve. More important, the scout platoons will experience first hand the difficulty associated with integrating supporting fires with their scheme of maneuver. Equally important, all supporting units gain invaluable experience in coordination. Additional training benefit comes from firing their weapons. With the proper mix of command emphasis, resourcing, planning, and coordination, the LFX for scouts can become the premier training event for the entire squadron.

Notes

[1]FM 25-4, *How to Conduct Training Exercises,* September 1984, p. 59.

[2]FM 17-98, *Scout Platoon,* 1987, pp. 1-4 and 1-5.

Major Timothy P. Edinger was commissioned in Armor in 1979 from Stephen F. Austin State University, and holds a master's degree in advertising from Syracuse University. He has served in various armor assignments in 1-40 Armor, 4-73 Armor, 2-37 Armor, and 1-33 Armor in CONUS and USAREUR and as S3, 1st Squadron, 9th Cavalry Regiment, at Fort Lewis, Wash. He served as an APMS at Syracuse University. A graduate of the Armor and Infantry Advanced Officer Courses, CAS[3], and CGSC, he is currently serving as media relations officer for the Fort Lewis Public Affairs Office.

How Denmark's Army Uses Light Unarmored Vehicles for Reconnaissance

by Lieutenant Colonel Christian J. Andersen, The Royal Danish Army

Editor's Note: *Lieutenant Colonel Andersen, after reading several recent articles in ARMOR on the use of HMMWVs for reconnaissance, submitted this account of the Danish Army's reconnaissance assets and techniques, which depend on use of unarmored recon vehicles.*

Unarmored Mercedes-Benz recon vehicle of the Danish Army

Since the end of WWII, the Danish Army recon units have used light unarmored vehicles as scout cars. The first was the famous Jeep. Presently, we use the German Mercedes-Benz Gelaendewagen with good results.

When the Danish Army organized its recon units after the end of WWII, we used the U.S. organization as a model. We still use the same organization today, but have either modified weapons and equipment or introduced new equipment.

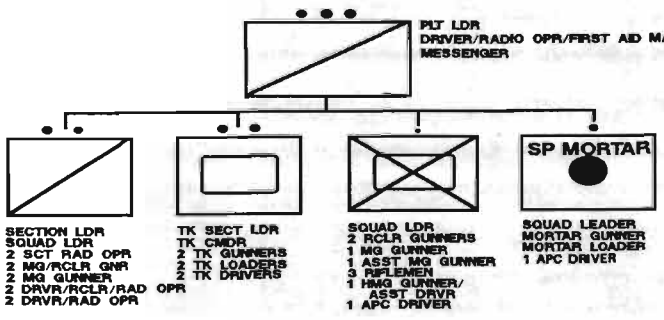
The basic army recon unit is the recon platoon, whose structure is shown in Figure 1 below. Each scout squad is equipped with two light machine guns, an 84-mm recoilless gun (the Swedish "Carl Gustaf"), a laser rangefinder, and infrared night vision equipment.

The tank section is equipped with the U.S. M41 light tank, recently modified by a Danish factory to include a new diesel engine, rubber

Reconnaissance Platoon Organization

Figure 1.

Armored infantry and SP mortar squads back up the tank and scout sections in the Danish Army's recon platoons.



Danish Army reconnaissance units use modernized U.S.-built M41 light tanks.

side skirts, a laser rangefinder, thermal night sight, NBC protection filter, and a new type of APFSDS tank ammunition for its 76-mm gun. These modifications have given the tank a combat radius of about 500 kilometers, a very fine night-fighting capability, and much better penetration against enemy tanks.

The armored infantry squad is equipped with a 7.62-mm light machine gun, a 12.7-mm heavy machine gun and an 84-mm recoilless gun.

The self-propelled mortar squad is equipped with an 81-mm mortar.

The recon squadron consists of three recon platoons, a HQ platoon, and a supply and maintenance platoon. The recon battalion — which belongs to the division — consists of three recon squadrons and a HQ platoon.

Danish Army recon units conduct three general reconnaissance missions — route reconnaissance, zone reconnaissance, and area reconnaissance.

When the recon platoon conducts route reconnaissance, the platoon, in principle, uses two standard formations, scouts in front or tanks in front, depending on terrain.

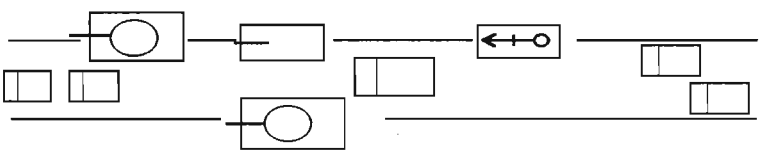
When moving through areas where there are houses, farms, hedges and woods — terrain with short observation distances and shooting ranges — scouts lead (Figure 2). The scout squad in front searches the terrain close to the road, supported by the tank section. The scout at the rear searches areas of interest that are farther away from the road.

This squad is also ready on order to bypass detected enemy positions or to reinforce the observation of the previously detected enemy positions. Finally, the platoon leader can choose to use this squad on one of the flanks in preparation for a quick bypassing of the enemy.

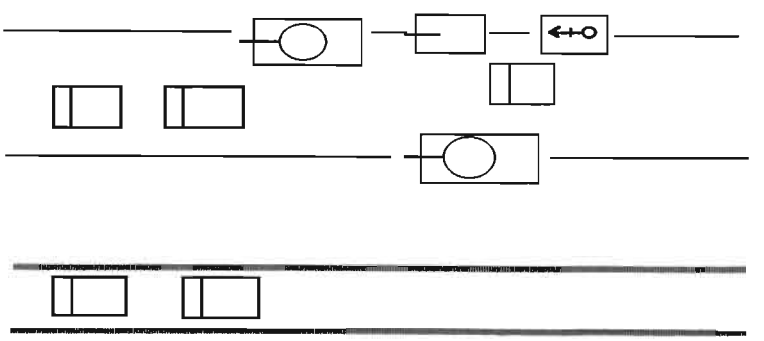
The infantry squad searches areas bypassed by the scouts (villages, forests, etc.) and secures the tank section. Tanks move to the front in open terrain. The tank section and

Figure 2.

Scouts in Front:
A formation used in built-up areas



Typical formation used in terrain with short observation and shooting ranges.



Scouts at the rear are prepared to move to the flanks to quickly bypass enemy positions or to reinforce when positions are detected.

the armored infantry squad search the terrain close to the road; the two scout squads search areas of interest at a longer distance from the road, one scout squad on each side of the road (Figure 3).

The self-propelled mortar squad, at the center of the formation, is ready to give fire support, regardless of the chosen formation.

During zone reconnaissance, the platoon uses a standard formation, as shown in Figure 4. The two scout squads are placed at each side of the tank section and the infantry squad. The tank section should be able to support the scout squads or the infantry squad as they move forward, changing positions as required. The self-propelled mortar squad is always placed in the center of the formation so it is able to support the scout squads as well as the tank section and the infantry squad. The tank section and the infantry squad operate in open terrain.

During area reconnaissance, the scout squads and the infantry squad serve as searching teams, and the tank section and the self-propelled mortar squad are used as fire-support teams. I want to stress that the formations shown are very basic (Figure 5).

The actual formation the platoon leader chooses has, of course, to be adapted to the shape of the terrain and the enemy situation. Moreover, the scouts can operate with or without support from the tank section.

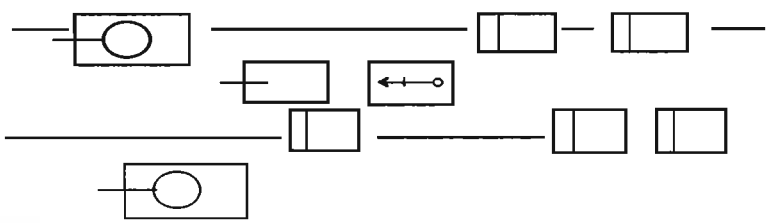
I have had very good experiences with the use of light, unarmored scout cars. They give the scouts the best opportunity to do their most important job — to see and report without being seen. Therefore, I agree with and support the viewpoints and experiences mentioned by Major Barry Scribner in his article in *ARMOR* (July-August 1989, pp. 36, 37). When you put scouts in armored cars, they do not see and — especially — hear very well. They do not dismount as often as they should, nor as willingly. Furthermore, they are tempted to engage in combat with the enemy, especially if their armored car is equipped with strong weapon systems. When scouts use unarmored cars, it keeps them out of combat — or at least should — and they concentrate on their main task: to see and report without being seen.

The light, open scout car used by Danish Army recon units has a very small silhouette and is, therefore, easy to hide. It is nearly noiseless and easy to mount and dismount. The scouts are, of course, not as well protected in a light, open car as in an armored car, but every enemy position today will be supported by antitank weapons, so it makes no difference if an armored or unarmored scout car runs into enemy units by mistake. Both type of cars could be destroyed.

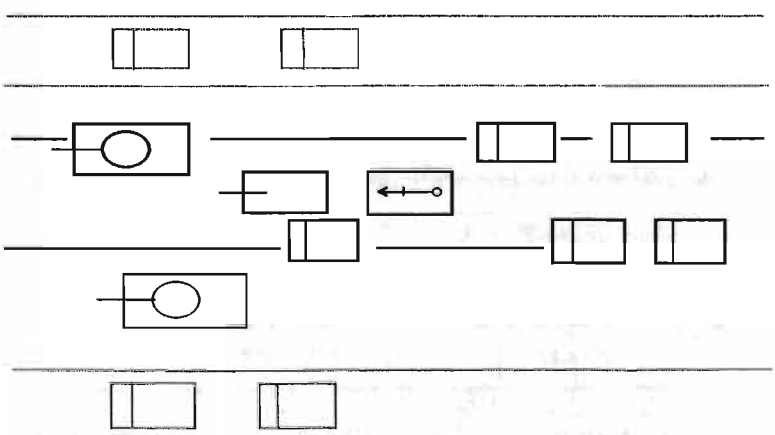
One of the big problems in reconnaissance is to penetrate the enemy front line and then survive in enemy occupied areas. I think that the organization of our recon units is well suited for these tasks. Of course, we will try to penetrate not only with the scout cars but also with the tanks and APCs. If it seems impossible to penetrate with the tanks and the

Figure 3.

Tanks in Front:
A formation for open terrain

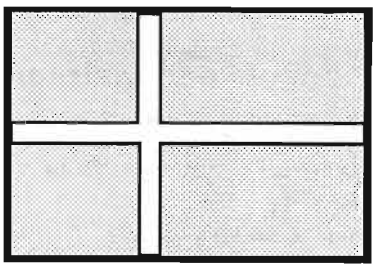


Tanks lead in open terrain (above), searching the area close to the road, with scouts available to move to the sides of the road to search areas at greater distance (below).



Hiding in Plain Sight...

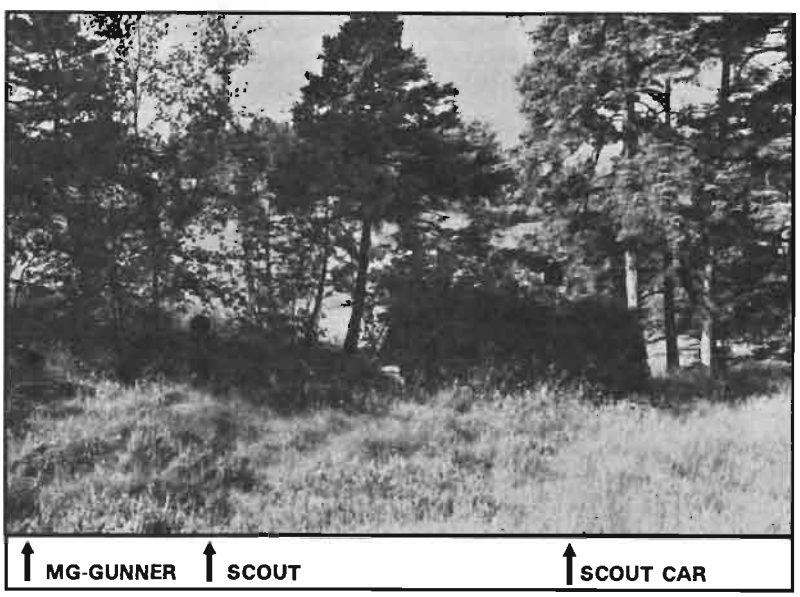
Denmark's Reconnaissance Teams Apply Stealth, Camouflage, and Quiet, Unobtrusive Vehicles



Small, low, Mercedes recon vehicle, heavily camouflaged

Danish Army recon forces reason that both light, unarmored reconnaissance vehicles and heavier armored scout carriers face numerous enemy hand-held antitank weapons. They have elected to depend on stealth for survivability.

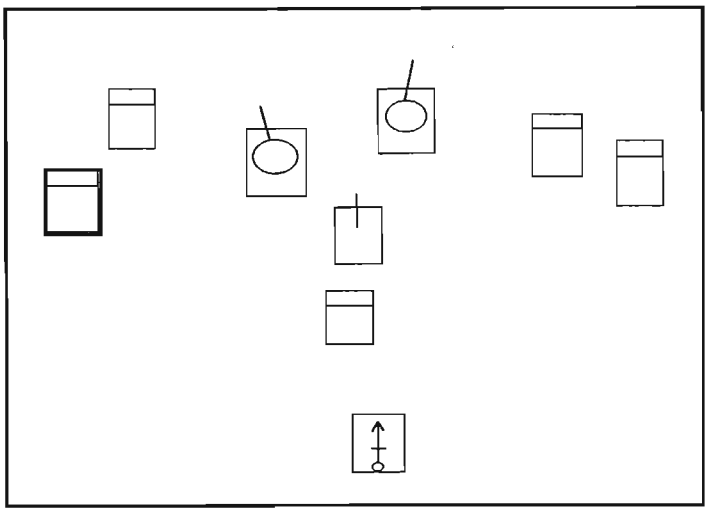
"When scouts use unarmored cars, it keeps them out of combat — or at least should — and they concentrate on their main task, to see and report without being seen...."



In the 1988 Boeselager competition between NATO reconnaissance squads, "The Danish scout squads were the only scout squads that used light, unarmored scout cars. They were among the very few...that passed into 'enemy' terrain without being detected...."

Figure 4.

Zone Reconnaissance



Standard formation for zone reconnaissance has scout squads at either side of the formation, with tanks, mortar, and infantry close enough to support them.

APCs, the small, light cars alone should have a fair chance to penetrate and to survive too.

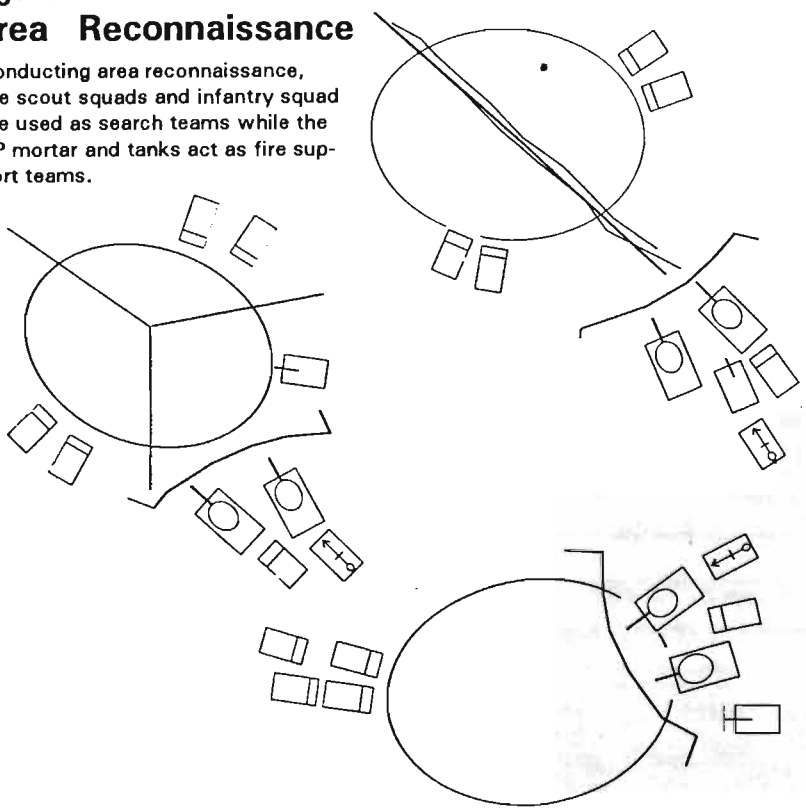
In 1988, one of my scout squads participated in the German Boeselager competition for recon squads of the NATO alliance, the first time Danish Army recon units participated, and another Danish scout squad participated in 1990. At both competitions, the scout squads were given the mission to penetrate the enemy front line and carry out reconnaissance in an enemy occupied area of 7 x 35 kilometers in order to detect enemy positions, enemy reserves, enemy minefields, the status of some important bridges, etc., all in three hours. Twenty-four scout squads participated. The Danish scout squads were the only scout squads that used light, unarmored scout cars. They were among the very few — if not the only scout squads — that passed into "enemy" terrain without being detected. Most of the armored scout squads would not have reached the final goal if the "enemy" had used live ammunition. They were declared destroyed enroute. They were, therefore, not able to transmit vital information about the enemy situation in the area.

This is just an example of my experiences with the advantages of light, unarmored cars for reconnaissance. I am sure that other readers of your magazine can contribute other examples.

I am a strong believer in using light, unarmored scout cars for reconnaissance. If one uses the scout to see and report without being seen, the light, unarmored scout car is best.

Figure 5.
Area Reconnaissance

Conducting area reconnaissance, the scout squads and infantry squad are used as search teams while the SP mortar and tanks act as fire support teams.



Lieutenant Colonel Christian J. Andersen of the Royal Danish Army is a member of the Jutland Dragoon Regiment, a unit created in 1679. He has served with tank units, armored infantry units, and reconnaissance units and commanded a recon battalion for 2-1/2 years. He is presently deputy commander of the 2d Jutland Armored Infantry Brigade.

Chemically Contaminated Areas: How to Find Them And Bypass Them Quickly

by Captain (P) Robert C. Neumann

Introduction

One of the continuing trends at the NTC is the inability of task forces to cope with terrain contaminated by persistent chemical agents. Numerous attacks slow down when maneuver elements find a contaminated area and cannot rapidly bypass. The use of persistent chemical agents to create obstacles and deny critical terrain is a tactic that many of our potential enemies use. This article will provide techniques for what to do when faced with chemically contaminated areas.

The Ground Work

The first step is to ensure NBC is thoroughly integrated into the intelligence preparation of the battlefield. The S2 and chemical officer must accurately determine the enemy's capability and doctrine to employ chemical agents. Based on the S2's development of enemy courses of action, the chemical officer must determine where the enemy is likely to employ persistent chemical agents. He includes these possible areas of contamination on the enemy situation template. If they affect the maneuver plan, he then designates templated contaminated areas as named areas of interest (NAI). The S2 and chemical officer then develop a collection plan to coordinate information gathering. They jointly develop possible indicators of the contaminated area at the designated NAIs. Once the collection plan is complete, they develop the reconnaissance and surveillance plan.

If possible, NBC reconnaissance units confirm or deny the presence of contamination at the designated NAIs, but if NBC reconnaissance assets are not available, the unit can employ its scout platoons from armor or mechanized infantry battalions. The scout platoon mission training plan (ARTEP 17-57-10 MTP) includes tasks to determine whether NBC contamination exists and its extent. The scouts can find a bypass around contaminated areas as part of their zone, area, and route reconnaissance.

The Contaminated Area

Threat forces use persistent chemical agents to create obstacles, deny terrain, and create delayed casualties. Various systems can deliver persistent chemical agents: artillery, mortars, rockets, missiles, aircraft spray tanks, bombs, and land mines. The location and type of target will dictate the delivery system. Artillery or multiple launched rockets are the most likely delivery systems for creating contaminated areas in the forward combat areas. The amount of agent carried by each type of munition varies.

To get the best spread of the agent over the target, the munitions are fuzed to burst above the target. When a munition detonates at ground level, it deposits most of the agent in the shell crater, minimizing the contaminated area. When the munitions burst above the target, wind speed and direction directly affect the spread of the agent. As the munition bursts, the heavier droplets will fall faster, and the smaller ones will drift downwind. The most heavily contaminated area is near the burst. The chemical agent will radiate in a bell shape in the direction of the wind. This is important to remember, because the prevailing wind direction will assist you in determining the general orientation of the contamination once you find it.

The length of time a persistent chemical agent will remain a hazard depends on many variables: temperature, wind speed, soil conditions, humidity, the type of agent, and soil and foliage. In the case of HD, a persistent blister agent, it will take 10 hours for 90 percent of the agent to evaporate at 86 degrees fahrenheit in sandy soil. A persistent nerve agent, VX, will require 25 hours for 90 percent to evaporate under the same conditions. But it is important always to physically check an area to confirm or deny the presence of chemical agents, rather than to rely on predictions on how long a chemical agent will persist.

NBC Reconnaissance By the Scout Platoon

While armor or mechanized infantry battalion scout platoons have an implied mission to conduct NBC reconnaissance, they have no established procedures or techniques to guide them to find contaminated areas. The first rule is to employ them in this role only if the templated area directly impacts on the unit's scheme of maneuver (i.e.,

the templated area lies astride the axis of advance). A second rule is to employ the entire scout platoon to find the contamination; anything less will ultimately lead to consumption of more resources. The third rule is to expect to be contaminated if you are successful in locating the contaminated area, so be prepared to coordinate for and execute a decontamination operation.

The scout platoon must carefully prepare to recon a contaminated area. Precombat checks of all chemical detection and identification equipment is critical. The platoon must have the NBC equipment shown in Table 1. All personal protective equipment is checked and is fully operational before the start of the mission. The preparation of the platoon's vehicles is important. M9 chemical detector paper is applied along the sides, front, and rear of the vehicle at locations where the vehicle may pick up contamination.

The M8 chemical alarm is mounted on top of the vehicle where it is secure and protected from any air currents generated by the movement of the vehicle. Never operate the alarm inside the vehicle without the exit port filter. It is also important to remember that the M8A1 chemical alarm only detects nerve agent vapors and that the alarm may not immediately activate at the edge of a contaminated area.

Critical NBC Equipment

Equipment	Individual	Vehicle
M8 paper	X	
M9 paper	X	X
M256		X
M8 alarm		X
CAM		X
Marking kit		X
M13 DAP or M11		X

Table 1

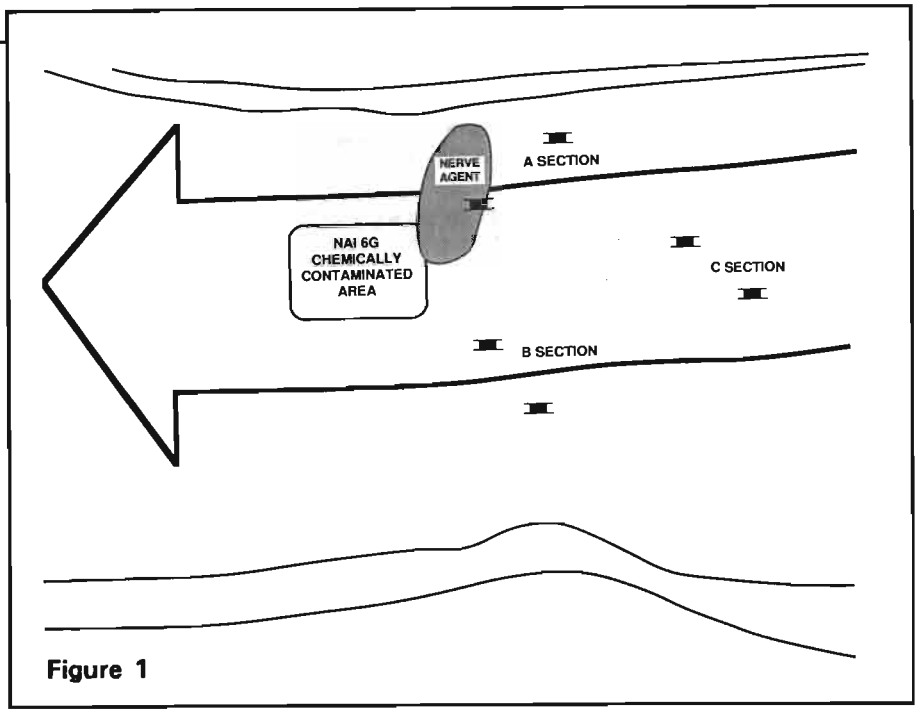


Figure 1

The platoon moves along a designated route to a point approximately three km from the NAI. At this point, the platoon will assume MOPP 4. If the platoon is approaching from the downwind side of the NAI, the platoon should assume MOPP 4 earlier to prevent casualties from the possible downwind vapor hazard. The platoon will operate in three sections in a platoon vee (figure 1). The distance between individual vehicles in each section is not greater than 400 meters. The distance between sections is not greater than 400 meters. This allows the platoon to check a zone 2000 meters wide. The sections will move in bounding overwatch with the lead vehicle bounding no more than 200 meters.

Once a vehicle has bounded, the crew must check for contamination. The crew will perform two checks: air sampling with the M8 chemical alarm, and liquid and terrain sampling with M8 detector paper. Once the vehicle stops, the M8 chemical alarm will activate if there are nerve agent vapors present. One crew member will open the ramp door and test the ground or foliage for contamination using a piece of M8 detector paper attached to a stick. If there is contamination present, the detector paper will immediately change color. If no contamination is detected, the crew will notify the overwatching vehicle to bound. The platoon will continue to check for contamination through the NAI until one vehicle finds contamination.

Once one vehicle finds contamination, the platoon will immediately halt. All vehicles will check for contamination in their immediate area. The platoon leader will report the initial location of the contamination. The platoon will reform into two three-vehicle sections. The section with the vehicle that has found the contamination will then continue to determine the rough boundaries of the contamination. The other section, if uncontaminated, will move to avoid the hazard area and continue with any other reconnaissance tasks.

The section at the contaminated area will form a section vee-formation using the vehicle in the contaminated area as the base vehicle. The base vehicle has the mission to continue to move forward and find the far side of the contamination. The crew will continue to check for contamination every 200 meters. The

M8 chemical alarm can be reset rapidly by installing the flow meter until the alarms stops sounding. Once the flow meter is removed, the alarm is ready to detect nerve agent vapors. Once the base vehicle has stopped detecting contamination, the vehicle will take one more bound (200 meters) to insure that the crew has found the initial far side.

The vehicle to the right of the base vehicle will place a marker to designate the initial near side. The vehicle then moves forward 200 meters and checks for contamination. The crew can find two things at this point, contamination or no contamination. If contamination is detected, the vehicle turns 90 degrees to the right and moves 200 meters and checks again. If no contamination is found, the vehicle moves forward 200 meters and checks again. This process of going straight or turning will continue in a box-like movement until the vehicle has crossed the initial far side line, this is the initial right limit of the contamination. The movement of the vehicle depends on the orientation of the contaminated area. Figures 2 through 5 demonstrate the execution of a mission for various orientations.

Once the vehicle has reached the initial far side line, the vehicle will move toward the base vehicle while checking for contamination. The

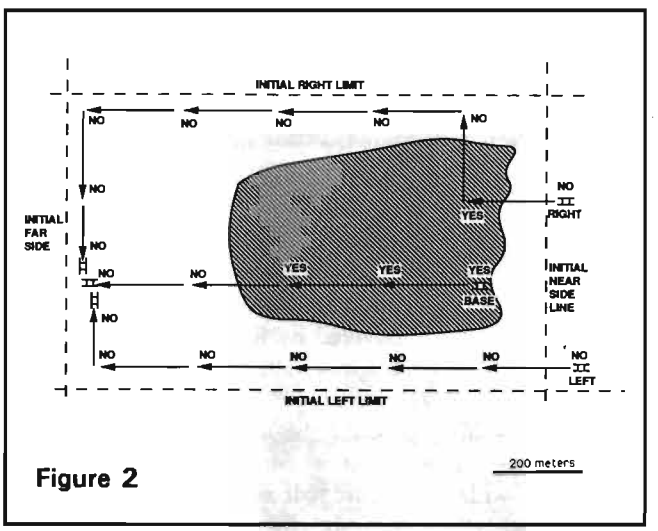


Figure 2

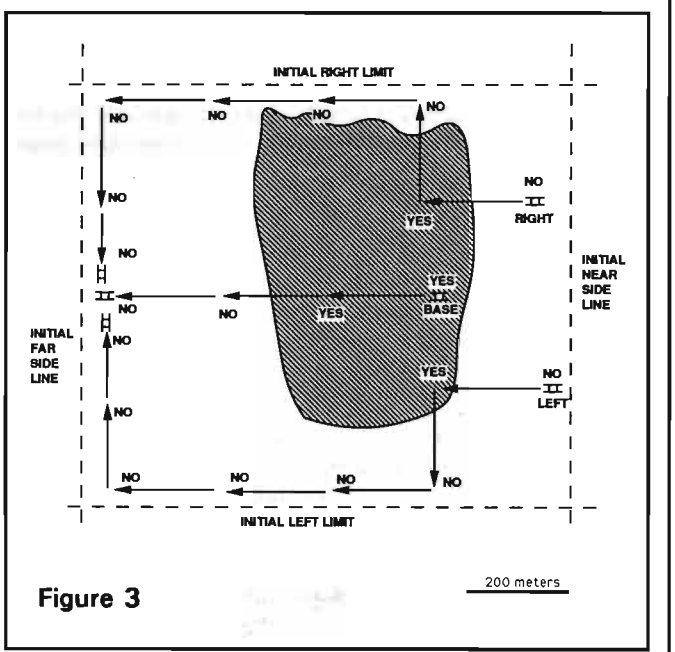


Figure 3

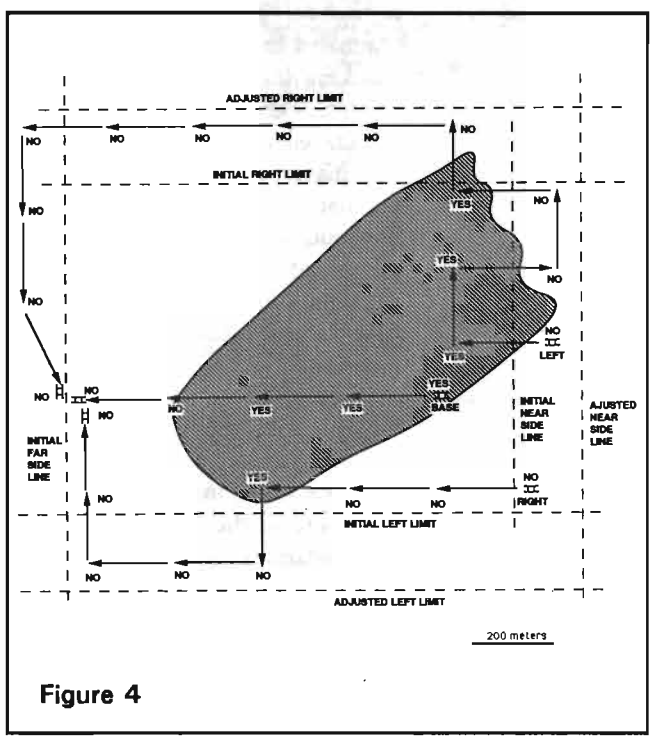


Figure 4

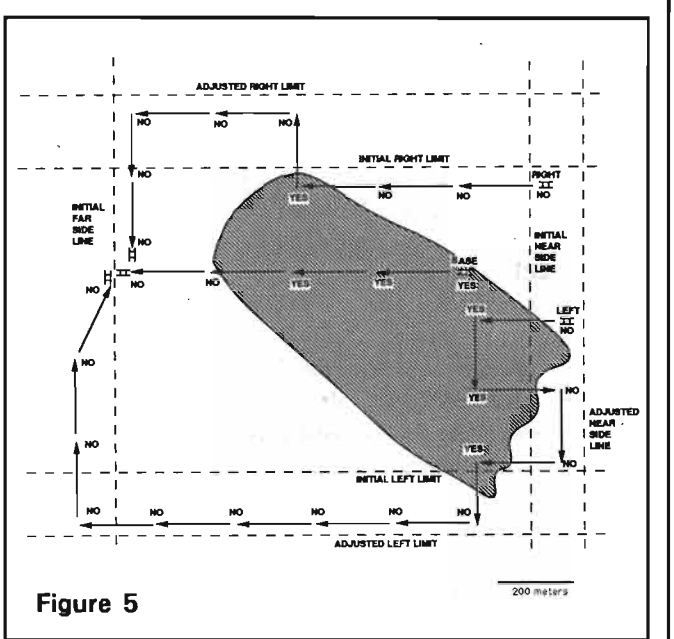


Figure 5

vehicle to the left of the base vehicle will execute the same movement as the right vehicle, except its first turn will be to the left. While this sounds complicated on paper, it is not difficult to execute. The section leader must receive continuous reports from the other vehicles on their findings, positive or negative. From these reports, the section leader will plot the findings to get a general idea of the layout of the contamination. Good navigation skills and navigation aids such as the global positioning system are essential for this operation.

Once all vehicles have crossed the initial far side line, the section leader will determine if any of the initial contamination limits (far, near, right, and left) need to be adjusted. Remember that the pattern of contamination is oriented in the direction of the wind at the time the chemical attack occurred. Once the section leader is satisfied that the limits of the contamination have been determined, the section will move to the near side and determine the best route to bypass the contaminated area. The section will also erect warning markers to indicate the bypass route and the location of the hazardous area. The best device to use as a marker is a VS-17 panel tied to a camouflage pole or a picket. It is critical that the markers are visible for at least 200 meters.

After the section has determined and marked the bypass, the section will remain in the area and conduct soldier skill decontamination (individual wipedown and operator spraydown) as necessary. The section will act as guides until the battalion task force has bypassed the contaminated area. The section will then move to a decontamination site and undergo deliberate decontamination. It is entirely possible that all three scout vehicles are contaminated. If the section has minimized the extent of contamination by strict contamination avoidance measures, the decontamination should take no more than one hour. The crews, not having dismounted in the contaminated area, will only require MOPP gear exchange. The vehicles will require an initial washdown, DS-2 application and wait, and a final rinse. No interior decon should be necessary if the crews were careful. Strict contamination avoidance/mitigation procedures will allow the scout section a rapid turnaround time.

While this procedure is designed for the six-vehicle Bradley scout platoon, it is easily adaptable for the new 10-vehicle HMMWV scout platoon. The best organization of the HMMWV scout platoon for this type of mission is four sections of two. Two sections and the platoon sergeant will execute the NBC reconnaissance mission, leaving two sections of two and the platoon leader free for other missions. The two sections and the platoon sergeant will use the section vee-formation to intially find the contamination. This formation allows the sections to check a zone 1600-meters wide. Once the contamination is found, the vehicle in the contamination becomes the base vehicle and right and left vehicles are designated. The two remaining vehicles attempt to find bypasses around the contaminated area.

The Lead Maneuver Element Encounters A Contaminated Area

It is possible that the reconnaissance phase of the operation does not detect a contaminated area.

Perhaps the scouts missed the contamination while conducting their reconnaissance, or the templating of the contaminated areas was not accurate.

Maybe we just didn't bother to look for the contamination, or the enemy executed the chemical attack after we completed our reconnaissance.

Whatever the reason that the contaminated area has gone undetected, our lead maneuver element has just entered the contaminated area. Each maneuver element must prepare itself for operations in a contaminated area, just as the scout platoon did. Chemical alarms are mounted, and chemical detector paper is affixed.

The unit's first indication that it has entered a contaminated area is most likely soldiers exhibiting symptoms of chemical agent poisoning. The unit must react quickly, take individual protective measures (mask), and transmit a warning. If the unit is in direct-fire contact, continue the mission and fight "dirty." If the unit is not in direct-fire contact, execute a rapid bypass drill. Remember, the enemy has placed that contaminated area out there for a reason. It is an obstacle, and the enemy will have it covered by fire. The longer you stay, the more attrition you will suffer.

Once the lead element determines it is in a contaminated area, all elements halt and check their immediate position for contamination. The first "clean" element has found the initial near side. The element in the contaminated area will continue forward, checking for contamination every 500 meters. The unit commander, based on the enemy situation, the terrain, and his assessment of why the contaminated area is there (push us to the south into the fire sack, deny this avenue of approach, etc.) will determine the direction of the bypass. The first "clean" element, based on the commander's assessment, will move 500 meters to the rear (this is the initial near side line). The element will turn 90 degrees to the right or left and move 500 meters. After moving 500 meters, the element will check for contamination. The element can find two things at this point, contamination or no contamination. If contamination is detected, the element will turn 90 degrees and move 500 meters to the rear and check again. If no contamination is found,

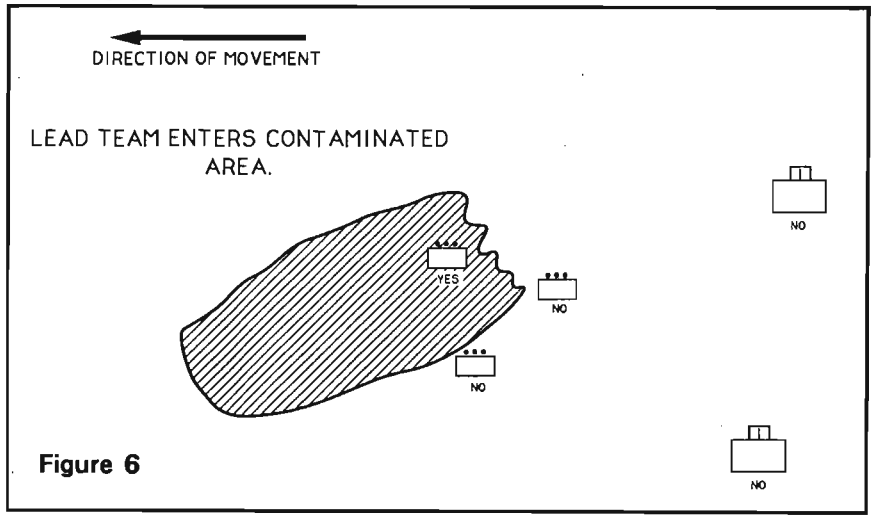


Figure 6

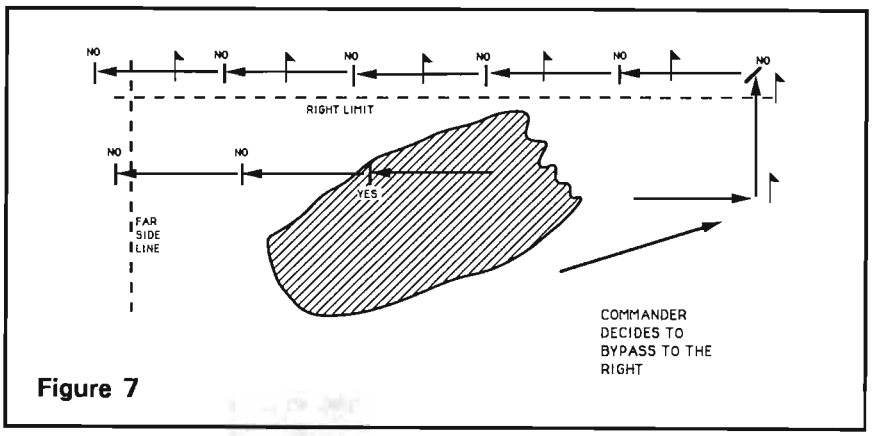


Figure 7

the element will turn 90 degrees in the original direction of travel and move 500 meters and check again. This process is continued until the initial far side line is crossed.

The purpose of this drill is not to find the limits of contamination, but rapidly to find a contamination free bypass route. The element finding the bypass route should clearly mark the route. VS-17 panels on poles or pickets, colored smoke, or guides are effective techniques for indicating the bypass route. Figures 6 and 7 describe a rapid bypass drill.

Conclusion

Current doctrine fails properly to address the tactics for dealing with contaminated areas. While a contaminated area by itself will not cause a unit to fail its mission, it can be a contributing factor to mission failure. Numerous times at the NTC, units encounter a contaminated area and:

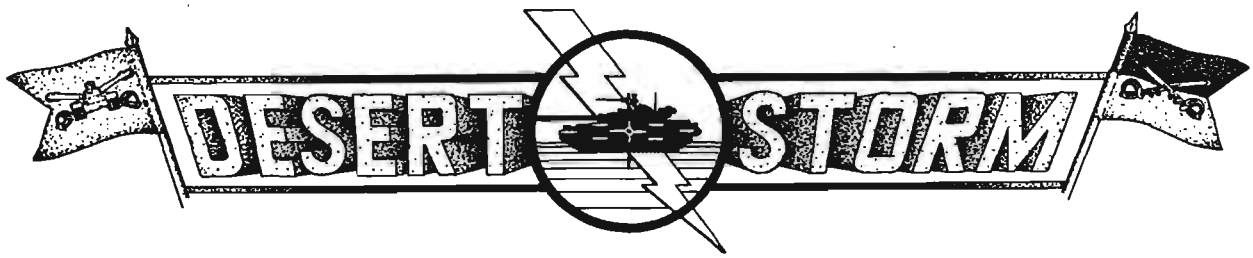
- lead element becomes combat ineffective because of chemical casualties
- unit formation is not achieved or is disrupted
- unit suffers moderate losses to enemy air and indirect fires while stopped behind the contaminated area
- trailing forces move into the contaminated area and suffer losses because area is not marked
- unit attempts to fight "dirty" and is quickly attrited because of the degradation caused by MOPP 4.

Units must be prepared to find, mark, or bypass chemically contaminated areas during combat operations. NBC reconnaissance units are few and cannot support all units on the battlefield. The two techniques described above will assist units in dealing with chemically contaminated areas.

Acknowledgements

Many people contributed to the development of these techniques, but these individuals assisted me the most; LTC (P) Scott Wallace, CPT Buff Bruce, and CPT Wayne Brainard, all members of the Armor Task Force Training Team (Cobras) at the NTC.

Captain (P) Robert C. Neumann graduated from Norwich University in 1980 with a BS in chemistry. His previous assignments include assistant S3/chemical officer, 1-87 Infantry; brigade chemical officer and assistant S3 plans for 2d Brigade, 8th ID; brigade chemical officer for 1st Brigade, 2d AD; commander, 44th Chemical Company, and assistant division chemical officer, 2d AD; and assistant S3 trainer at the National Training Center. He has deployed to the NTC four times, three as a chemical company/team commander. A graduate of the Chemical Officer Basic and Advanced Courses, Field Artillery Officers Advanced Course, Marine Corps Amphibious Warfare School, and the Command and General Staff College, he is currently the brigade chemical trainer at the National Training Center.



Training to Prevent Fratricide

by Captain Jeffrey S. Wiltse

"As American units wheeled and maneuvered to execute the huge flanking movement that was to encircle and destroy Iraqi ground forces, the fringes of two U.S. Army corps became entangled. An armored cavalry unit, spotting the combat engineers on its perimeter, grew convinced that they were Iraqis; the engineers thought the same of the cavalry. What followed was chilling and tragic.

"The troopers issued a radio challenge, followed by a warning in Arabic. They fired shots over the engineers' heads. Then the cavalry advanced. The engineers ran. From a pursuing Bradley Fighting Vehicle came a machine-gun burst... One soldier dead, a fellow engineer badly wounded - victims of the oxymoron known as "friendly fire."[1]

The view that fratricide, or friendly fire casualties, always have and always will be a tragic but inevitable part of the controlled chaos of war must be more closely examined. On today's highly fluid and lethal battlefield, better ways and means of managing friendly forces and identification of friendly vehicles can help prevent the occurrence of fratricide. Current doctrine and tactics, field expedient methods and "high-tech" devices for identification, friend or foe (IFF), and systems still under development will all assist in reducing the scourge of "friendly fire" from the next battlefield.

In past wars, fratricide was not as serious a problem, mainly due to the size of the armies involved, circumscribed battlefields, and line-of-sight weapons. However, in this age of large and mobile armies, massive battle areas, and "high-tech" weapons of greater range and lethality, the possibility of fratricide has increased. In World War II, the rate of fratricide was two percent of U.S. casualties. In Vietnam it was 2.85 percent. It rose to 4 percent of all deaths in OPERATION JUST CAUSE.[2] The numbers for OPERATION DESERT STORM are still unclear, but *Armed Forces Journal International* reports 10 U.S. soldiers killed and eight wounded in action from friendly fire.[3] Due to the low number of U.S. casualties, this could work out to a percentage of fratricide close to 20 percent.

What can be done to prevent fratricide in future wars and lower this increasingly grim statistic? There are two basic areas that will be addressed for the answer to this question, the first being the doctrine and tactics with which we train to fight, and the second, the equipment we have to command and control the fight.

AirLand Battle doctrine is discussed in *FM 100-5, Operations*. It is based on securing or retaining the initiative, and exercising it aggressively to accomplish the mission. In instilling this initiative and aggressiveness into the force, the very nature of the doctrine may create a certain level of unavoidable risk, and that risk may result in fratricide. While this may be unavoidable, there are a number of specific training issues that can be stressed, practiced, and followed to assist in lowering the incidence of fratricide.

There is no training initiative that will eliminate fratricide completely, but some areas need to be re-emphasized to reduce fratricide. Generally, they fall under the headings of command and control, fire distribution and control, vehicle and aircraft recognition, and land navigation.

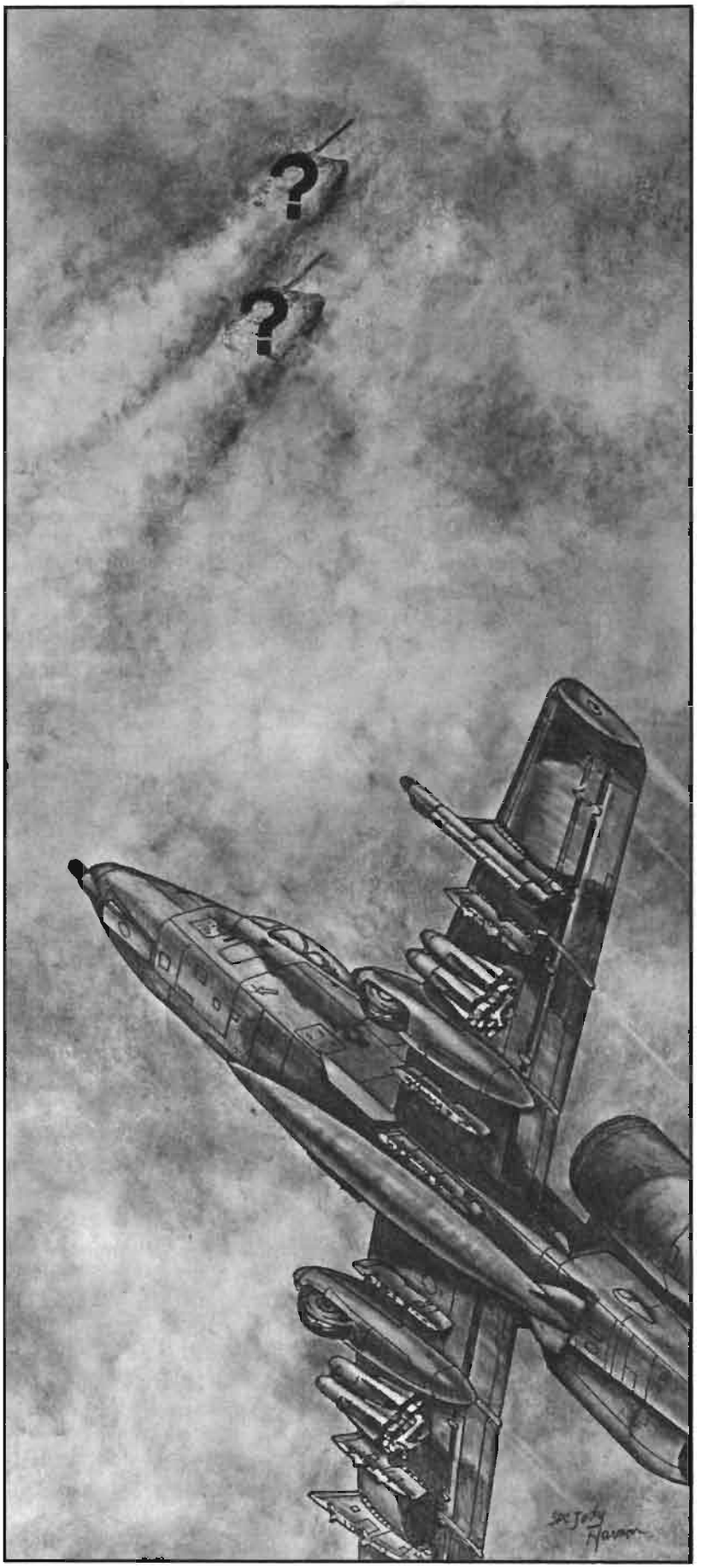
Training to prevent fratricide starts at the operation order. Paragraph 1B, Friendly Situation, is the commander's chance to "paint the picture" of the battlefield, to describe in words the disposition and mission of the units around him. From this paragraph, the implied task of flank coordination begins. The unit will know the forces arrayed around it, and will not be surprised when a friendly unit comes up on its right or left flank. By using this paragraph properly, the commander increases his units' awareness of the friendly forces around them.

As it applies to fratricide, fire distribution and control refers to everything from the basics of range cards and sector sketches and the planning and rehearsal of the direct fire plan to the integration and rehearsal of the indirect fire plan. The key to prevention of fratricide is the rehearsal. The fog of war will still creep in and confuse the actual execution of the plan, but a thorough rehearsal will weed out problems in the plan and prevent someone from being in the wrong place at the wrong time. Range cards and sector sketches must

be standardized and exact, starting with the individual tank up to the company, so that the final fire plan incorporates all assets, as well as a final check to ensure proper placement of these assets to prevent fratricide.

One of the biggest problem areas in fratricide prevention is the identification of friendly forces. This is particularly difficult when allies and enemy use the same vehicle types. During OPERATION DESERT STORM, for example, both the Syrians and the Iraqis used the T-72 and some other types of vehicles. It is therefore important that identification of both ground vehicles and aircraft be directed at the specific vehicle type and the country using it, not just whether or not it is friend or foe. Crews need to practice vehicle recognition both through regular optics and thermal sights. The UCOFT is a good system for practicing this, and the Armor School has also put out a video on thermal identification characteristics of U.S. vehicles to assist in this training.[4] One of the stations of the Tank Crew Gunnery Skills Test (TCGST) is vehicle identification. This is a good opportunity to test the soldier's skills, but the test must be realistic and thorough.

Re-emphasis on land navigation, at the individual tank, platoon and company level, is another training area that will help reduce fratricide. It is imperative that these elements know exactly where they are on the battlefield. All flank unit coordination and tracking of the battle rely on the units' ability to report where they



are. Land navigation is one of the more important factors in the prevention of fratricide, and one that technology is starting to help us solve.

Other aids include field expedient methods and available equipment, such as the VS-17 panel for better air identification of friendly vehicles and front lines, specific markings, such as the inverted "V" that was used during OPERATION DESERT STORM, and the use of directional blinking IR or thermal lights (called "Bud Lights") to aid in nighttime air identification. Additionally, a number of systems using new technology are now becoming available. They will greatly enhance our ability to identify friendly forces, track their locations, and communicate with them at a greater distance.

The greatest gains — and perhaps the area with the greatest potential for future technological development — is in command and control. These systems decrease fratricide by controlling the problems associated with command and control and misidentification of friendly forces as enemy.

SINCGARS (Single Channel Ground & Airborne Radio System) provides the communication base for other advanced systems to transfer information. The SINCGARS improvement over the current radio system is its increased range and secure frequency-hopping capability.

The IVIS (inter-vehicular information system) transfers information on the vehicle to other like-equipped vehicles, allowing for better tracking of friendly forces.

The Pos/Nav (position navigation) system displays the vehicle position and heading references to the driver and commander, giving them the correct ground location at all times.

SLGRs (Small Lightweight Global Position Receiver) gives the individual the ability to know exactly where he is, day or night, to the nearest meter.

Additionally, there are a number of proposed systems designed to aid in the prevention of fratricide in the Block III future tank. These systems integrate the sights of the vehicle with an IFF system. This "sensor fusion" provides for the positive identification of combat vehicles as the target is identified. This is done through both a passive (non-responsive) system and an active (responsive) system. The passive system examines a target and compares its characteristics with an on-board library of known vehicle characteristics (i.e. the number of road wheels, type of track, engine sounds, etc.) to identify the vehicle type. The active system then "interrogates" the vehicle, much in the same way that an aircraft transponder system works, to identify it as friendly or unknown. These systems can work on both ground vehicles and aircraft.

The incident described at the beginning of this article involves the three leading causes of fratricide; loss of command and control, lack of planning and coordination, and misidentification of the target.[5] There is nothing new or mysterious about the causes of fratricide. The use of new high-tech equipment would have aided in preventing some of the problems that occurred in this incident, however, it must be remembered that it is training, not technology, that will ultimately reduce fratricide. The best equipment, with untrained and undisciplined crews, cannot accomplish its mission. The new technology will enhance the prevention of fratricide, provided the soldiers are adequately trained, the operation is properly planned and coordinated, and the system is fully integrated into the combined arms team.

Notes

[1]Jebl, Douglas, "War Analysts Delving Into What Went Wrong," *Los Angeles Times*, Mar 24, 1991, p. 1.

[2]Galloway, Archie, LTC., *Fratricide: Inevitable Condition Of The SWA Battlefield?* Army Initiatives Group, Feb 1991.

[3]Goodman, Glenn W. Jr., "Air Force Leaves Mk XV Industry Partners Twisting in the Wind," *Armed Forces Journal International,* May 1991, p. 58.

[4]PAN AO 515-89-0067, "Thermal Identification of U.S. Tracked and Wheeled Vehicles."

[5]Schrader, Charles R., LTC., *Amicicide: The Problem Of Friendly Fire In Modern War,* U.S. Command and General Staff College, Fort Leavenworth, Combat Studies Institute, Dec 1982.

Captain Jeffrey S. Wiltse received his Regular Army commission as a Distinguished Military Graduate from the University of Washington. A graduate of AOBC, JOMC, and AOAC, he has served as tank platoon leader and company XO in 2-72 Armor, Korea; and HHC XO, battalion S-1 and brigade S-1 for 3-68 Armor and 1st Brigade, Ft. Carson. During OPERATION DESERT STORM, he served as the Asst S-3 2/2 ACR. He is currently assigned to Command and Tactics Branch, U.S. Army Armor School.

LETTERS

Continued from Page 5

Badge has been jealously maintained. The fact remains that we are a "combined arms" Army. Why then do we continue to ignore the combat achievements of every branch except the Infantry?

The composition of American forces in the Kuwaiti Theater of Operations was based on heavy tank units: 1st Armored Division, 2d Armored Division (Forward), 3d Armored Division, 1st Cavalry Division, 2d Armored Cavalry Regiment, and the 3d Armored Cavalry Regiment. Why should the accomplishments of so many tankers not be recognized with a combat badge? And what about the tankers in the mechanized infantry divisions, such as the 24th and 1st Infantry? Why should the Bradley crew who rode next to them receive a Combat Infantryman's Badge, while they receive nothing? A combat patch is not enough. Tank crews deserve recognition with their own distinctive badge.

The criteria for the award should be very simple. If a soldier served on a tank in direct fire combat, he should be eligible for the award, regardless of his MOS. Consequently, the turret mechanic pressed into service as a loader or gunner would be eligible for the badge.

The massive armor advances of Desert Storm are the first of their kind since the Allied sweeps through North Africa and Europe in World War II. If there was ever a time to adopt a Combat Tanker's Badge it is NOW. The justification for it lies in the burned-out hulks of hundreds of Iraqi tanks and the thousands of tank tracks that criss-cross the Iraqi Desert. We must strike while the iron is hot and before the memory fades.

RONALD J. BASHISTA
1LT, Armor
Erlangen, FRG

Scouts Must Train Reconnaissance by Fire

Dear Sir:

The official start of the ground war was still four days away. Somebody neglected to inform the 1st Cavalry Division. Deceiving the enemy along the Wadi al Batin, the First Team continued to hold the attention of the dug-in Iraqi forces. In support of the deception, the scouts of Task Force 1-32 Armor used an old technique that is often neglected during today's MILES wars — reconnaissance by fire.

Just after nightfall on 20 February 1991, both three-vehicle sections of M3 CFVs occupied turret-down positions along the east-west sand berm that distinctly separates Saudi Arabia from Iraq. Atop the berm, scouts with shovels cleared fields of observation under a dark, clear sky. Patiently, 20 M1A1s and the task force mortar platoon waited for targets. After several hours of uneventful observation, Alpha, the western section, acquired six enemy soldiers laying a hasty minefield. Clearly observed through the MTIS (a recently fielded Israeli night sight) at a range in excess of five kilometers, the enemy remained out of mortar range. Continued observation revealed the perimeter of the minefield, but the enemy moved no closer. Frustrated scouts watched the enemy finish his work and link up with a truck, which sped north. Hopefully, more would return.

Scanning. More scanning. Then a target. The Delta Company tankers engaged several trucks with 120-mm HEAT. The Iraqi survivors fled southeast toward a trenchline. Unknowingly, the enemy stood out clearly in the reddish haze of our ISUs. Days and nights training at Fort Hood and the NTC were about to pay off. The great irony was that our first shots would support a technique that we had never really used before.

The concept of reconnaissance by fire is explained well in FM 17-98 and the scout platoon leader's course, but in the world of MILES it is often neglected. Even that night, our baptism of fire, it was not a deliberate decision as much as merely the next logical step in developing the situation.

With illumination already falling, the initial call for high explosive mortar fire quickly resulted in a "Shot, over," on the command net. Reconnaissance by fire in action. In retrospect, starting with indirect fire was a good choice. The enemy remained deep in the trenchline as two subsequent adjustments produced a solid "fire for effect" mission. To our benefit, reconnaissance by indirect fire never revealed our OP or vehicle positions, and allowed our M3s (those not on flank security) to focus on a known enemy position. The prime disadvantage of indirect fire is the fear of unresponsiveness from the firing unit. In our case, this was resolved by exceptional mortarmen, and speaking directly to the mortar platoon leader on the command net. Furthermore, while mortars are great for suppression of area targets, a great deal of skill is required to drop a round in a trenchline. The mortars served their purpose. As soon as the fire for effect ended, four Iraqi soldiers emerged from the trench and raced to a small, concrete storage building.

It was now time for reconnaissance by direct fire. The building was 1000 meters from my eastern section. The Iraqis thought they had reached refuge. Since we were still undetected, there was no rush to engage. My wingman and I slowly pulled forward, unmasking our guns, and my gunner efficiently began destroying the building with concentrated 25-mm HE rounds. As large chunks of concrete flew away from the structure, my previously silent wingman engaged and killed the first two fleeing enemy soldiers with 25-mm fire. The other two Iraqis, witnessing the fate of their companions, sought cover behind chunks of the destroyed building. With my vehicle providing security, my wingman, SSG Ted Carlin, engaged the remaining two enemy until they either escaped or died.

Reconnaissance by direct fire has several inherent advantages. For one, direct fire can quickly hit a point target and then swiftly shift to secondary targets. The platoon leader has absolute control of the engagement. Second, either in tanks or CFVs, a choice of weapons and ammunitions are on hand to suit the tactical situation. The key disadvantage, especially at night, is the unmasking of your vehicle types and positions. Also, using your own direct fire weapons obviously reduces your internal ammunition supply.

In conclusion, reconnaissance by fire is an effective means of identifying and destroying enemy forces. I imagine that many of us have previously tried this technique in training, but due to the properties of the MILES laser, it was abandoned. As we all know, there is no effective mortar MILES, and the laser beam meets with much less success than 25-mm HE against a concrete wall. Remember, train to win, but do not concentrate on MILES gunnery alone. The tricks of killing and escaping the flashing yellow light are practiced by our Army in training areas all over the world. MILES is a great help for realistic training, just do not let the training aid become the focus. Reconnaissance by fire, indirect or direct, is simple, effective, and must be trained in peace because it will be used in war.

COURT R. HORNCASTLE
1LT, Armor
1-32 Armor, 1st Cav Div
Ft. Hood, Tex.

CSM Jake Fryer
Command Sergeant Major
U.S. Army Armor Center

The NCOER Counseling Form

One of the best training documents we armor leaders have available to us is the NCOER Counseling Form. It clearly allows a leader the opportunity to provide vision and focus, which directly relates to mission accomplishment and contributes significantly to unit METL crosswalk. I'd like to present the following vignette as an example.

A tank platoon sergeant has just received a staff sergeant into the unit, and his assignment will be tank commander on the platoon's third tank (the platoon sergeant's wingman). Upon completion of reception, sponsorship, and certification, the platoon sergeant, with the use of the NCOER Counseling Form, establishes what he, as the tank commander's rater, would like the new tank commander to accomplish.

1. For him and his gunner to establish a 34611 UCOFT rating after a period of six months.

2. Enrollment of one of his tank crew members into the EIA program.

3. Train and evaluate his tank crew on appropriate TCGST tanks during sergeant's time.

4. Train and evaluate his tank crew on appropriate CTT tasks during sergeant's time.

5. Conduct Armament Accuracy Checks with his crew quarterly during scheduled motor stables.

6. Ensure all crew members are qualified drivers and licensed appropriately.

7. Conduct tank tactical tables A-B-C during scheduled sergeant's time.

8. Qualify expert with both his side arm and the tank's M16A2.

9. Ensure the tank sustains an EMC maintenance rating during the rating period.

10. Qualify all tank tables.

11. To be successful in physical training, obtain an APFT score of 260+ (EIA eligibility).

12. A tank crew average APFT score of 260+ for an excellence rating in leadership.

13. Initiate a smoking cessation program for himself (fitness) or for crew members (leadership).

14. Have one of his crew members earn battalion Soldier/NCO of the Month honors.

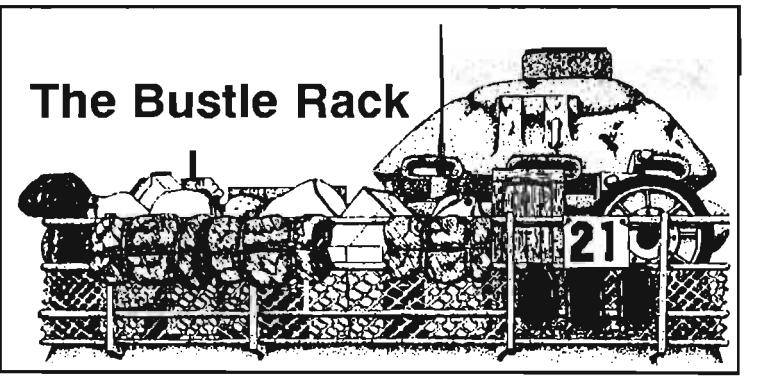
15. Read one professional development book a month.

The list of tasks, the frequency of them, and the level of desired proficiency to be obtained are endless. The block ratings of "excellent," "successful," and "needs improvement," can be structured and defined as to what is necessary to obtain each rating.

The above example could be tailored to the needs of any unit or mission. The bottom line is the NCOER Counseling Form is a training tool to foster and promote professional development and growth of leaders.

Are you an armor leader using it as such?

The Bustle Rack



Depleted Uranium (DU)

Some M1A1 Abrams crewmen may be concerned about the potential health hazards posed by DU armor and ammunition. First, all M1A1s do not have DU armor. Only those tanks with a "U" at the end of the serial number have DU (serial number is located right side of turret by grenade storage box).

All M1A1 service sabot ammunition does contain DU. Under most conditions there is virtually no health hazard from DU armor or ammunition; however, crewmen must understand that in certain circumstances there is a hazard. When DU is sealed within the armor, the health hazard is virtually nonexistent. If the DU should be exposed, then the threat increases; however, the level is still considered no worse than an X-ray.

The greatest hazard exists if the DU is inhaled or ingested, which may occur if the tank burns, or receives a catastrophic hit. Similarly, the only significant DU ammunition threat exists when the sabot penetrator strikes its target. The cloud of smoke and dust created from the initial impact would contain some oxidized uranium, which is hazardous. In both circumstances, the greatest hazard that a crewman would face is from the actual fire and secondary ammunition explosions, not from oxidized uranium.

Anytime an accident occurs involving the turret armor of a DU-equipped tank, personnel involved should immediately notify their chain of command and radiological survey personnel. Also, M1A1 crewmen should be familiar with the procedures on page 2-506 of TM 9-2350-264-10 and TB 9-1300-278.

POC at Directorate of Total Armor Force Readiness is CPT Schute, DSN 464-4847/7114 or commercial (502) 624-4847/7114.

Reunions

The **740th Tank Battalion** will hold its 18th annual reunion in Oklahoma City, Okla., 29 August-1 September 1991. Contact Harry F. Miller, 2150 6th Avenue, North #102, Seattle, Wash. 98109, or phone (206)283-8591.

The **10th Armored Division** Veterans Association will hold its reunion 29 August - 2 September 1991 in Birmingham, Ala. For more information, contact Samuel F. Murow, Box 213, Bay Port, Mich. 48720, or phone (517) 656-3551.

The **2nd Tank Battalion** Association, **9th Armored Division**, will hold its reunion September 19-22 at Fort Riley, Kan. For more information, contact Barb Boese, 202 E. Market, Dodge City, Kan. 67801, phone (316)225-5925; or Ruth Ganser, 713 5th St., Mosinee, Wis. 54455, phone (715)693-3104.

Senior Officer Logistics Management Course (SOLMC)

SOLMC is specifically designed to update commanders and their primary staff at the battalion and brigade level in the logistics arena. The course encompasses maintenance, supply, and transportation procedures, as well as hands-on experience with vehicles, weapons, ammunition, medical, communications, NBC, and quartermaster equipment. The course is open to officers in the grade of major or above in the Active and Reserve Components, U.S. Marine Corps, allied nations, and DOD civilians in the grade of GS-11 and above. The one-week course is conducted ten times each fiscal year at Fort Knox, Ky. Class quotas may be obtained through normal TRADOC channels. For more information, contact CPT Hammerle, DSN 464-7133/3411 or commercial (502)624-7133/3411.

SOLMC Schedule

Course Number 8A - F23

Class Number	Report Date	Start Date	End Date
505	15 Sep 91	16 Sep 91	20 Sep 91
1	6 Oct 91	7 Oct 91	11 Oct 91
2	5 Jan 92	6 Jan 92	10 Jan 92
3	26 Jan 92	27 Jan 92	31 Jan 92
4	1 Mar 92	2 Mar 92	6 Mar 92
5	29 Mar 92	30 Mar 92	3 Apr 92
6	5 Apr 92	6 Apr 92	10 Apr 92
7	26 Apr 92	27 Apr 92	1 May 92
8	10 May 92	11 May 92	15 May 92
9	14 Jun 92	15 Jun 92	19 Jun 92
10	20 Sep 92	21 Sep 92	25 Sep 92

BOOKS

Two New Books Tackle the Technology Of Tanks and Warfare

Technology of Tanks by Richard Ogorkiewicz. Jane's Information Group, Alexandria, Va., 1991, 424 pages in two hardbound volumes, slip-cased. $99.

This two-volume set is simply the best introduction to tanks and their engineering history that has come along. The author, contributor to many worldwide military publications (including almost 90 stories for *ARMOR* in about 40 years) has created a reference that should be a world standard in military and civilian libraries for decades. He blends scope and detail to a degree seldom seen in works on technology. Anyone who approaches this book with NO knowledge of tank technology and takes the time to read it, front to back, will emerge with a good basic grounding in the history, employment, and engineering of these very specialized vehicles. This is a remarkable achievement in 424 pages.

But *Technology of Tanks* is more than a primer. While it could serve well to introduce a journalist or general reader to the major issues in the field (it would have been wonderful to have a few months ago, when the networks were calling for information), I'm equally certain that most officers who have a good grounding in tanks would also learn a lot from it. It is one thing to know facts, another to see how they fit together, and this is the real achievement here. In Ogorkiewicz's many articles in *ARMOR,* for example, he focused on a particular new development or new vehicle. The limitations of the article form precluded the linkages and historical breadth that makes this book worth reading.

Ogorkiewicz opens with two chapters of a general nature tracing the development of tanks from WWI to 1945, and from 1945 to the present. Subchapters detail tank development in each of the major nations that have employed and developed armored vehicles. The chapters that follow are more specific, each devoted to a separate aspect of tank technology: tank guns and ammunition, ballistics, vision and sighting systems, illuminating and night vision systems, fire control, gun control, guided weapons, mobility of tanks, tank engines, transmissions, suspensions, armor, etc. Each section is not only a masterpiece of exposition on engineering, but a fine source for those interested in the burgeoning field of the history of technology. I was very impressed by how evenhandedly he traces the credit for new developments — too much of this kind of engineering writing is chauvinistic, with too little credit and respect for things "not invented here."

The "down side," of course, is the price. Books in general seem to have gotten far, far too expensive lately, and specialized books have taken this inflation to an even higher order of magnitude. The military field is not the only area where this has happened (I recently gaped at the price list for a group of required texts for pre-med students, and it is easy to see how they graduate so deeply in debt!). This volume is not particularly *luxe* in binding, despite the slipcase and two-book format. At a glance, you'd figure half the list price would be about right, but I suppose specialization has a cost. In this case, given the quality of the author's work, you get what you pay for.

JON CLEMENS
Managing Editor
ARMOR

Technology and War From 2000 B.C. to the Present by Martin Van Creveld. Pergamon Press, Oxford, U.K. 1991, 342 pages. $44.50.

Noted historian Martin Van Creveld has produced another superb work with his Technology and War. Best known for two earlier books, *Supplying War* (1977) and *Command in War* (1985), Van Creveld has written an expansive study of the relation between technology development and the conduct of warfare from 2000 B.C. to today.

With a doctorate from the London School of Economics, as a Fellow of War Studies at King's College in London, and from his current position teaching history at the Hebrew University in Jerusalem, Van Creveld certainly has the academic credentials for a work of this type. His research is thorough and detailed. The author has organized the book into four parts: the Age of Tools (to 1500 A.D.), the Age of Machines (1500-1830), the Age of Systems (1830-1945), and the Age of Automation (1945-present).

He focuses on the development of military technology as well as the non-military technologies, such as transportation, communications, and education and how they combine to affect warfare

through the ages. Van Creveld believes that the impact of weapons technology generally is limited to tactics. The other non-military technologies generally influence operational art and strategy. For example, Van Creveld argues that weapons technology was not significant in early warfare, but that mobility (a non-military technology) was the key to victory. Swords and spears, and later rifles and artillery, dictated tactics. Mobility, first the horse, then later the railroads and aircraft, affected strategy and therefore had a greater influence on the conduct of warfare. Van Creveld also discusses the importance of writing and literacy as a technology with profound impact on warfare.

Van Creveld's most interesting conclusion is that the development of technology follows a cumulative and predictable logic, while warfare is uncertain, unpredictable, and subject to all human foibles. This must fit the old argument that one is a science and the other is an art. Additionally, he argues that, while the two logics are opposed to one another, they may actually complement each other to produce victory, depending on how they mesh.

The two chapters on the infrastructure of war, and the chapters on command of the sea, professionalism, and mobilization warfare are the best reading. Van Creveld's style is scholarly but wordy, which may tire the reader. The extremely high cost of this book will also probably deter most readers. Borrow it if you can. Even so, *Technology and War* is a better product than Robert L. O'Connell's recent similar book, *Of Arms and Men* (1989). This is an excellent, recommended book, but Van Creveld's two earlier books actually are easier (and more fun) to read.

W.D. BUSHNELL
COL, USMC
Ft. Knox, Ky.

The Desert Generals by Correlli Barnett. (New, enlarged edition). Indiana University Press, Bloomington, 1983. 352 pages. $11.50.

Correlli Barnett first wrote *The Desert Generals* in 1960 to refute and challenge the memoirs of Field Marshal Bernard Montgomery and his accompanying television appearances — "remarkable exercises in self-praise." Many Americans, and indeed a fair number of Britons, would sympathize with Barnett's objective.

This new edition loses nothing to the original. The additional commentaries at the end of each chapter, reviewing what was originally written in light of what has been heard since 1960, are fascinating. Understandably, there is much to corroborate Barnett's original thesis.

The book is a carefully researched study of the six major British commanders in the Western Desert campaigns, from the crushing defeat of the Italian 10th Army to the ultimate victory at El Alamein — O'Connor, Wavell, Cunningham, Ritchie, Auchinleck, and Montgomery. The picture is intriguing. Both talent and ineptitude abound. Churchill — that omnipresent figure with a finger in every pie — is shown in an unflattering light, arrogant, devious, and meddling.

We should all be thankful that Hitler and the German High Command were equally incapable of supporting Rommel, although even that great man makes crucial mistakes in those unforgiving sands. Montgomery inevitably comes out badly. His ability is undoubted. His inability to be magnanimous to those crucial to his successes is also undoubted.

Officers should read this book and learn. Here is a fascinating and educational study of high command.

J.M.W. MOODY
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Fort Knox, Ky.

Passage of Lines

Lafayette G. Pool 1919-1991

Chief Warrant Officer 2 Lafayette G. Pool, tank ace with the 3d Armored Division during WWII, died at his home in Killeen, Texas, on May 30, 1991, at the age of 71.

In his "Commander's Hatch" column in the November-December 1989 issue of *ARMOR*, MG Foley said of Pool:

"Sergeant Lafayette Pool of the 3d Armored Division demonstrated... the spirit we find among our NCOs today. During the summer and fall of 1944 in Europe, he directed the efforts of his tank crew so effectively that his record of success still stands as an example of excellence today.

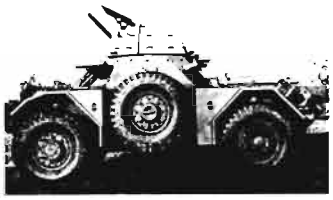
"In three short months his tank accounted for 258 enemy vehicles destroyed, 250 prisoners taken, and 1,000 killed... His example inspires all of us to achieve the same high standards of professionalism."

Pool retired from active duty in 1960 at Fort Hood, Texas. Among his awards and decorations were the Distinguished Service Cross, Legion of Merit, Purple Heart, the Belgian Fourragere and French Croix de Guerre.

A motor pool in Frankfurt, Germany, bears his name, and the soon-to-be-built M1 Tank Driver Trainer facility at Fort Knox will be named in his honor. Interment was with military honors at Fort Sam Houston, Texas, on June 3, 1991.

MIDDLE EAST LIGHT ARMOR

EE-11 URUTU WITH 90MM GUN



FERRET SCOUT CAR

AMX-10 WITH FOUR HOT ATGM'S

EE-9 CASCAVEL

ALVIS SARACEN APC

PANHARD VCR/T4 WITH UTM 800 TURRET WITH FOUR HOT ATGM'S

MT-LB

BMP-2

BRDM-2U COMMAND VEHICLE

CHARACTERISTICS

	EE-11 URUTU	FERRET	AMX-10	EE-9 CASCAVEL	ALVIS SARACEN	PANHARD	MT-LB	BMP-2	BRDM-2
COUNTRY OF ORIGIN	BRAZIL	GREAT BRITAIN	FRANCE	BRAZIL	GREAT BRITAIN	FRANCE	USSR	USSR	USSR
CREW	1 + 12	2	3 + 8	3	2 + 10	4	2 + 11	3 + 7	2 - 5 + 4
MAIN ARMAMENT	90mm GUN	7.62mm MG	20mm M693 GUN	90mm GUN	7.62mm MG	HOT ATGM'S	7.62mm MG	30mm CANNON	14.5mm MG
VARIANTS	20mm AND 25mm TURRETS, 81mm MORTAR, COMMAND, AMBULANCE, CARGO AND RECOVERY	NO KNOWN VARIANTS	25mm AND 90mm GUNS AVAILABLE, COMMAND, AFCV, AMBULANCE AND REPAIR	NO SIGNIFICANT VARIANTS	COMMAND, AMBULANCE AND OPEN ROOFED	APC, COMMAND, ANTI-AIRCRAFT AMBULANCE AND REPAIR	CHEMICAL RECON SA-13 CARRIER, ENGINEER RECON, ARTILLERY TRACTOR AND ACRV	COMMAND, MAINTENANCE AND SERVICE SUPPORT	CHEMICAL RECON SA-9 ANTITANK PSYOP
MAJOR USER COUNTRIES	IRAQ, JORDAN UAE	IRAQ, BAHRAIN QATAR UAE, YEMEN	IRAQ, QATAR SAUDI ARABIA, UAE	IRAN, IRAQ	JORDAN, KUWAIT UAE, IRAQ	UAE, IRAQ	IRAQ	KUWAIT, IRAQ	YEMEN, IRAQ

This 24-by-27-inch poster of Middle East Light Armor is the latest in a series on Threat tanks, armored vehicles, helicopters, and ATGMs to be produced by Threat Division, Directorate of Combat Developments, Fort Knox. Units may request copies by phoning DSN-464-AWTS or 502-624-AWTS.

PIN: 068523-000
U.S. Government Printing Office 1991
748-050/91-4