

ARMOR



MORGAN'S 1862 CHRISTMAS RAID

PB 17-93-2

March-April 1993

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I believe it was Rudyard Kipling who said it's a wise and prudent man who can keep his head while all those about him are losing theirs. And amid the rumors, budget cuts, policy changes, and redefinition of the role of the military stands the armor soldier. He still has maintenance to pull, PT to do, subordinates to train, and with the time left over, a family to love and care for. He cares little for the stratospheric debate between the Pentagon and the White House and the Congress — save those issues which directly affect his life — for, after all is said and done, much more will be said than done. But while the posturing and verbal combat proceed at the levels far beyond what he can influence, he is nonetheless distracted. He wonders if he will have fuel enough to train next year, if the drawdown will catch him in a promotion vise, if he'll be dealing with sex and sexuality in his crew a year from now.

The greatest risk the armor soldier faces is losing sight of his unique purpose — training to fight the next war — by becoming absorbed in the national debate on

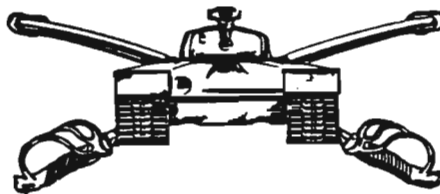
broad-sweeping policy issues. Regardless of how these institution-changing matters are resolved, his time will surely come to make professional and moral choices. But for now he must have a single-purpose. His mind must lock on offense, defense, and logistics, and his leaders must help him stay focused. *ARMOR* will be the one constant throughout this time of upheaval. Let us help you stay tuned to what is of immediate

importance. Major Barbour will tell about rehearsals, Captain Maus will talk of combat service support, and the remaining contributors will rivet your interest in mission-essential tasks.

If leaders and soldiers stay occupied with the business of gunnery, training, and leadership, we'll be able to respond with confidence to whatever our future holds. Kipling wrote, in *The Law of the Jungle*,

When pack meets pack in the jungle,
and neither will go from the trail,
lie down till the leaders have spoken —
it may be fair words shall prevail.

J.D. Brewer



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ARMOR

The Professional Development Bulletin of the Armor Branch PB-17-93-2

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AGS Questions

Dear Sir:

Your November-December 1992 issue contained a letter from Mr. Pruitt questioning many aspects of the Armored Gun System (AGS) Program. While the PM AGS, COL Dick Knox, should be the source for information on the program as a whole, following are some armament answers that may be of some interest to your readers:

- The comparison of AGS competitor designs is not appropriate for public discussion by the Government. While an article relating design options to the AGS require-

ments could be very interesting, particularly one understanding the design limits of a 20-ton vehicle, suffice it to say that the source selection board chose the clear winner overall. What will be very interesting is the required comparison to the M551A1 Sheridan later in the program.

- The autoloader compartment doesn't have an NBC seal but is isolated from the crew compartment. The two turret openings mentioned are both in the autoloader compartment. NBC protection will be provided by filtered air through tubing to M25/M42 masks.

- The breech access cover in the turret roof serves as the blast panel in the roof.

FMC has designed their autoloader compartment to fail prior to rupturing the access door between the crew compartment and the autoloader compartment. Although laws of physics will not allow Abrams protection levels in a light vehicle, compartmentalization lessons learned will be applied to the AGS program consistent with its fightability and intended mission.

- The system is designed so that if the autoloader failed, the gunner would manually operate the autoloader and the commander would acquire targets and fire the gun. The rounds can be manually loaded. It is a challenging task in a cramped space with little leverage, but it can be done.

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•The commander has the same capability as the gunner. If there is only a driver and one other crewman, he would take the commander's position. If the autoloader also failed, he would have to manually load and then take the commander's position.

•The [turret drive] hydraulic system was basically picked for weight, size, and performance over an electric system. The autoloader was already a hydraulic system, so hydraulics were still going to be on board. However, there are no hydraulics in the crew compartment, only in the autoloader and engine compartments. PM, Tank Main Armaments has a demonstrator electric gun turret drive program for U.S. tanks; but its integration, even on the Abrams-series tank, is a lower, unfunded priority.

•FMC's system meets the Army's requirement for 30 rds (15 ready) minimum as specified in the requirements. There are ways to get many more rounds on board or strapped to the outside, but there is a penalty in weight and survivability. Additional rounds could be added to the forward storage locations, the autoloader itself, and hung on the outside in containers. These things could be done for certain missions if the tradeoffs are acceptable, but there are limits to ammunition stowage in a light tank.

•The M240 coax was specified by the Army. There may be other systems available worldwide, but the U.S. opted to continue to use the M240 for cost, compatibility, and acceptable performance reasons in the NDI (non-developmental item) program. You can be sure that major problems encountered integrating the M240 will be addressed to the user's satisfaction.

I encourage all Armor professionals to contribute to the discussion during the coming five years of the program. The future of Armor in the light forces and its participation in the full spectrum of warfare, including rapid force projection, is at stake. All must realize that we need ideas and, most importantly, program support — the battlefield is littered with failed programs in this area. Budget decisions so far restrict all modernization efforts to upgrades of current vehicles and the AGS Program. Let's weight the main attack — see you on the objective.

FRANKLIN Y. HARTLINE
COL, Armor
Project Manager
Tank Main Armament Systems

AGS Answers

Dear Sir:

We are writing to you in response to statements and concerns over the Armored

Gun System by Mr. Pruitt in the November-December 1992 *ARMOR*. Perhaps we can clarify some of his misconceptions and inform the entire Armor community about key aspects of the AGS design.

The AGS program has been crafted to provide the light and contingency forces with a highly transportable, mobile 105-mm gun system which will provide direct-fire support when tanks are not available. With this in mind, the user community set the requirements and prioritized them with great thought — transportability, or the ability to deploy rapidly, was the highest priority, followed closely by lethality, survivability, and sustainability. To provide such a system in a timely manner, our acquisition strategy employs the Non-Developmental Item (NDI) integration approach which embraces maximum use of NDI items as subsystems, modules, and components.

It appears Mr. Pruitt has formulated many of his concerns after viewing the FMC Close Combat Vehicle Light (CCVL) demonstrator, which FMC has used for a number of years to pursue light combat vehicle technology opportunities. Reflecting the user's unique requirements, additional substantive features have been added, thus the AGS will be somewhat different in design and appearance than the CCVL. With this in mind, let's go through Mr. Pruitt's concerns and address them in sequence.

•**Engine deck too high.** The AGS design will easily allow the turret to rotate over the back deck during normal operations as well as during forced insertion missions accomplished by Low Velocity Air Drop (LVAD).

•**Turret has prominent shot trap.** The user has specified very definitive ballistic protection requirements at three levels of performance, representing LVAD, roll-on/roll-off (RO/RO), and maximum protection configurations. These include protection against direct-fire weapons as well as survivability from overhead and mine attack. FMC's AGS armor design is being extensively tested through analysis and live-fire plate and ballistic structure testing, as well as full-up vehicle vulnerability live-fire testing to ensure it meets these requirements, to include no prominent shot traps.

•**Turret opens when main gun is depressed and fired, breaking NBC seal.** The autoloader compartment, separated from the crew compartment, does open when spent shell cases are ejected, and when the main gun is fired in maximum depression. However, the user specified that the AGS NBC protection would be accomplished by using ventilated face pieces... thus there is no sealed NBC overpressure system to be broken.

•**Main gun ammo carried in the turret.** Ammunition on the AGS is carried in three

compartmented locations away from the crew, below the turret ring. These are the magazine associated with the autoloader and two hull storage compartments. These compartments all have blow-off panels similar to those used so effectively in the Abrams tank.

•**Automatic gun loader patterned on naval designs.** The autoloader selected for the AGS is produced by the Naval Systems Division of FMC, which has a long history of producing autoloaders for the U.S. Navy. This autoloader and the XM35 Gun System along with the magazine ammunition are separated from the crew, as noted above. In the AGS, autoloading is the normal mode of operation. The autoloader will be thoroughly and rigorously tested both as a component and in the full-up prototypes to prove its great reliability before it is fielded. In the event of most postulated malfunctions, the FMC design does allow the gun to be loaded and fired in the manual mode by removing an access panel located to the left of the commander and gunner positions. All phases of the design to permit this capability have been MANPRINTED and have been the subject of close scrutiny by recent user juries, as well as previous testing and demonstrations on the similar CCVL autoloader at Fort Knox and Fort Bragg. Is it as easy as in the Abrams? No, but it can be accomplished by the 5th percentile commander or gunner. All 21 rounds in the magazine can be fired in this manner.

•**Will the commander be able to fire the main gun?** Yes, the commander has a full suite of redundant gunner's controls as well as a link to the gunner's sight.

•**What happens in a two-man crew when the autoloader fails?** The AGS has a three-man crew consisting of the commander, gunner, and driver. Should one crew member be lost, the remaining crew member in the turret can still fight the vehicle via manual loading from the gunner's position. There will, of course, be a reduction in the rate of fire to approximately 2-3 rounds per minute.

•**Turret drive uses hydraulic fluid which burns.** As in M60- and M1-series tanks, the AGS also uses low flammability hydraulic fluid in its turret drive. In the event of any type of fire in the crew compartment, an automatic Halon fire extinguishing system is employed for crew protection.

•**Number of main gun rounds and rate of fire don't meet the requirement.** The AGS incorporates 21 rounds in the magazine, with another nine rounds compartmented in the hull. Its rate of fire is 12 rounds per minute. These performance features exceed the user's stated require-

ments of 15 ready rounds and an eight-round-per-minute firing rate.

•**The M240 is not a good coax.** The M240 is the coaxial machine gun on the AGS. The user community required use of the M240 and seems very satisfied with its performance in Operation DESERT STORM.

Right now, the AGS program is in its eighth month of our Engineering and Manufacturing Development (EMD) phase, which is for fabrication, logistic support, test support (and subsequent refurbishment) of six full-up AGS prototypes; fabrication of a ballistic hull and turret; and delivery of technical data. After extensive (and hopefully successful) Technical Testing and Early User Test and Evaluation, the Low Rate Initial Production contract award is scheduled for December 1994 with First Unit Equipped set for December 1997.

We hope this information is useful to Mr. Pruitt and to your readership in general.

CHARLES F. MOLER
COL, Armor
TSM, Armored Gun System

RICHARD L. KNOX
COL, Armor
Project Manager,
Armored Gun System

Toughest Two Weeks of Training Ever

Dear Sir:

I want to heartily second Major Brewer's article on the Idaho Army National Guard in the November-December 1992 issue, especially RCTCC at Gowen Field, Boise. I graduated from RCTCC in April, 1992, and can vouch for its effectiveness. It was the toughest two weeks of training that I have ever received. RCTCC is not easy to pass. Yet, when a soldier graduates from RCTCC, that soldier is trained. That soldier is ready to tank tank, not just talk tank. I urge every tanker, officer and enlisted, Active Duty and Reserve Component, to RUN to apply for RCTCC.

PETER A. ROBERTSON
2LT, Armor
LA Army National Guard

Hitler's Ardennes Gamble: "The End Was Inevitable"

Dear Sir:

Captain Kevin R. Austra ("From Behind the Dragon's Teeth: Hitler's Folly? Or Was

It?", November-December 1992 *ARMOR*) has done a commendable study of the terrain and frontier defense scheme, but in the grand scheme seen from then and now, let us consider the German position.

The tide had turned irrevocably against them in the west in 1942, with El Alamein, Casablanca, Oran, and Algiers and in the east, with the beginning of Stalingrad in 1942 and the monumental tank battle of Kursk in July of 1943.

As for a German offensive from behind the West Wall, Field Marshal von Rundstedt had considered it in September of 1944, but the taking of Aachen put paid to that. He took command of the Ardennes attempt as part of the duty to country of an old soldier, and with no expectation of the results demanded. As for German morale, Cole notes the "irreplaceable loss in military manpower."

The author points out that MARKET GARDEN, Montgomery's narrow attack toward the Rhine near the seacoast and its attendant streams and bridges, weakened Allied capabilities prior to Christmas. There was speculation in First Army circles that, had the same effort been made in the Stolberg Corridor, the Rhine could have been reached in the vicinity of Cologne, with attendant advantages which would have precluded the Bulge, all before Christmas of 1944.

Much has been made of Hitler's objective of Antwerp, but G-2 Periodic Reports of the U.S. 3d Armored Division for the period December 20-23 indicate a thrust up Highway 15, from Houffalize to Liege, going through Manhay, site of the 3d Armored CP on December 22, and Werbomont, the XVIII Airborne Corps' CP. To the left flank of the 3d Armored was its CCB, with 30th Infantry Division, facing Kampfgruppe Peiper. In both instances, the enemy advance was directed to the First Army supply centers within the triangle Liege, Vervier, Spa. In neither did they succeed.

Deep penetrations predicated on foraging for POL and rations supply are at high risk, and German Fifth and Sixth Army commanders had their eye on POL, rations, and loot, rather than Antwerp. Their failure left the 2d Panzer Division high and dry at Celles December 26, at the mercy of our 2d Armored Division of VII Corps.

In the meantime, the magnificent holding action at Bastogne crossroads with the above marked the turning point of the Battle of the Bulge.

Why the failure of Allied intelligence to foretell the danger? Certainly the indications were there, both in air force tactical reconnaissance reports of increased train activity and the direction thereof, but also in writing from the First Army G-2. Could it be

that the powers that be simply did not believe it possible?

As to concluding the Bulge fiasco, Montgomery chose what Von Rundstedt called the "small solution" — driving the Germans out, rather than cutting them off at the base.

Another reason for the German debacle (other than supply and personnel problems) was that the deeper the penetration, the weaker the line, much like what happened on a smaller scale at Mortain. Unlike Grant deliberately stretching Lee's line in Virginia, the Germans stretched their own line to their disadvantage, after which the end was inevitable.

HAYNES W. DUGAN
Historian
3d Armored Division Association
Shreveport, La.

With Thanks... And an Invitation to the Ball

Dear Sir:

Thank you for publishing General Donn Stary's review of Lewis Sorley's masterful book, *Thunderbolt. From the Battle of the Bulge to Vietnam and Beyond: General Creighton Abrams and the Army of His Times* in the September-October 1992 issue of *ARMOR*.

The members of the Creighton W. Abrams Chapter of the U.S. Armor Association, here in Washington, D.C., are delighted to have the life story of our chapter's namesake and his lasting contributions to the Army and our nation finally told. We are even more proud that Lewis "Bob" Sorley is a longstanding member of the Abrams Chapter.

The Abrams Chapter, which is one of the Association's largest and most diverse chapters, was founded in 1976 by a group of Armor officers who knew and served with General Abrams. As the first chapter formed outside Fort Knox, the chapter has earned a reputation for its contributions to the Armor community — Army and Marine — in the National Capitol Region.

Members of the chapter were the driving force behind the creation of the U.S. Armored Forces Monument, which was dedicated by Mrs. Abrams and the Army Chief of Staff in Arlington National Cemetery on Veterans Day, 1991. In addition, the chapter sponsors the Armor Ball, an annual event attended by well over 300 members and friends of the Combat Arm of Decision.

This year's Abrams Chapter Armor Ball will be held on April 3, 1993. Armor Associ-

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



Combined Arms and the Armored Force: Thinking About the Future

An armor soldier's responsibility goes far beyond training and fighting for today. Certainly, readiness is critical to the security of our nation, and keeping soldiers fit and well-trained is a moral and tactical prerequisite to keeping them alive. But another aspect of the armor soldier's duty is less concrete. It demands thinking, creating and constantly revising public and personal views of our profession — armored warfare. And as our world churns amid the cauldron of new, emerging nations, as well as older nations trying to recover their pre-Cold War status, there are bound to be questions about the nature, composition, and mission of our armored force. We cannot depend upon the civilian community, often unfamiliar with what we do and how we do it, to make a case for our future. We cannot depend upon Congress to recognize our value and ensure the integrity of our fighting force, particularly against the onslaught of budget cuts and restructuring. We cannot expect those nations we have liberated or jerked from the brink of starvation to clamor for our preservation; the lessons of history tell us that those we have helped will forget us all too quickly. The only people that can ar-

ticulate and define the case for armored forces in the future are the soldiers of all ranks, active and retired—anyone who thinks about our profession and who has shaped our present high-quality armor force.

It is high time we heard from some of you. What are the compelling reasons for an Armored Force, now and in the future? How can we, through technology, training, and leadership, make the right modifications to our present force structure to ensure the success of our Army? I would like to hear from you. I want to know what YOU think about these issues, and I can think of no better way to find out than having you respond on the pages of *ARMOR*. Here are what I believe to be some basic reasons for a strong, mobile, armored force over the next twenty years. I am sure you can think of others. At the Armor Conference in May, we will pursue these ideas, and hopefully, some of the ideas you submit as well.

The armored force is critical to our national security and the stability of an emerging world order because it offers some specific capabilities and advantages no other force structure

can match. It is the anchor of what General Adna R. Chaffee called "a balanced team of combat arms and services of equal importance and equal prestige."

Consider the capacity of Armor to:

Take and hold ground — Air power is wonderful. It allows ground forces to soften a target before risking the lives of thousands of soldiers; but Combined Arms wins wars!

Clear enemy ground forces and equipment — BDA isn't very accurate. Ask anyone who served in Desert Storm. — During the Gulf War, many Americans began to wonder if smart bombs and cruise missiles were sophisticated enough to stop and ask directions on the streets of Baghdad. But we found out, when we rolled into Iraq, that not everyone in those bunkers was killed or sent packing. It took a ground maneuver force, protected by armor and mounting direct-fire weaponry, to root out enemy ground forces.

Force an opponent to counter — Although difficult to measure, one tangible advantage of a well-trained

and technologically superior armored force is the counter-effect. By counter-effect, I mean the financial, training, and research effort a potential enemy must expend simply because we are present and ready to fight. If the tank is not the supreme weapon and backbone of the ground forces, then why does everybody want so desperately to defeat it?

Operate economically and consistently — Would it surprise you to know that Armor comprises only 4% of the Army's personnel strength, yet offers more than 40% of its combat power? During Operation DESERT STORM, the Third Armored Division—350 tanks strong—lost not a single one to maintenance failure.

Fight in all weather — Visibility is a factor influencing the effectiveness of all weapons systems, either ground, air or sea. But given our thermal vision devices and an aggressive mindset, an overcast sky will neither stop a tank company, nor impede an infantry patrol, nor prevent scouts from finding an enemy. Once we locate the enemy and the weather clears, our airpower can be brought full-force against the enemy. But without a protected, mobile, ground force busy looking for the bad guys, the Air Cavalry and the F-14s would have to spend valuable on-station time looking for targets. That would be both costly and dangerous.

Demonstrate that the best antitank weapons is another tank — Suppose Saddam Hussein had chosen to cross President Bush's "line in the sand?" No one questions the bravery and the talent of the 82nd Airborne Division, and that proven fighting force of infantry would have certainly made the Iraqis pay for such an attack into Saudi Arabia. But at what cost? How many lives would have been lost and how much valuable equipment destroyed? All it takes is one nut-

case with a couple of mediocre generals, a handful of part-time scientists, and money in the bank, to present a threat to the New World Order.

To psychologically distract and demoralize — The MacNeil-Lehrer News Hour recently showed video of a Marine Corps attack against Somali gunmen holed up in a two-story building and sniping away at U.S. troops. But the Marine infantrymen were not alone in their reply to the snipers. Poised in overwatch and supplying suppressive fire was a line of M1 Abrams, manned by Marine tankers, their main guns trained on the building, and prepared to up the ante as required.

Move fast and arrive with technological punch — On the battlefield of the future, the words of Confederate Cavalry General Nathan Bedford Forrest are more appropriate than ever—the winner will be the one who "gets there first with the most" and "puts a scare on the enemy and keeps it there." With the new Armored Gun System, we cannot only get there fast, but we can also pack some punch when we arrive. Until the big guys, i.e., the M1s and M60s, can close on the fight, AGS will carry the banner of armor/cavalry and deter an enemy

who will often be superior in number, if not in technology.

Save soldiers' lives through protected fighting vehicles — Without armor, how will soldiers close with and destroy the enemy? What will protect them as they approach the battle and sustain them during the fight? We have the best protected armored force in the world.

Keep the lid on a nuclear Pandora's Box — As long as conventional battlefield weapon systems can keep an enemy in check, and control the tempo and nature of a fight, we have the best possible chance of avoiding the introduction of nuclear weapons at the trouble spots of the world.

The Principles of War remain unchanged from the days when armies were first organized; and these principles — Objective, Offensive, Mass, Economy of Force, Maneuver, Unity of Command, Security, Surprise, and Simplicity— provide a sound framework within which an organized determination of the role of an armored force can be made. Given the ideas I've touched upon and the Principles of War, let me hear your views on the future role of an armored force in combined arms operations.

Ernest R. Kouma Tank Platoon Gunnery Excellence Award

On 29 January 1993, GEN Gordon R. Sullivan, CSA, approved the Ernest R. Kouma Tank Platoon Gunnery Excellence Award for an Army-wide tank platoon gunnery competition.

This competition will recognize the top Active Component (AC) and Reserve Component (RC) tank platoons in our Army, based on their normal tank gunnery performance. In the case of AC and round-up/round-out RC tank platoons, their performance on Tank Table XII and Tank Table VIII respectively will be used to determine the winning platoons. In the case of all other RC platoons, their Tank Table VIII scores within their 24-month window will be used to determine the winning platoons.

The concept is that normally-configured TO&E tank platoons undergoing their regular gunnery training will serve as the basis for this competition. Recognition of a top AC and top RC platoon, based on normal gunnery "business as usual," adds a degree of motivation to the Armor Force, overall, to strive to be the best. This concept specifically dismisses any resemblance to a gunnery shoot-off type competition similar to the Canadian Army Trophy competition. The idea is not to add additional requirements to units' existing gunnery programs.

Full details concerning the specifics on how this competition will be managed and winners selected will be announced via message to the force. Additionally, an in-depth article explaining the details will appear in the next issue of *ARMOR*. Good luck and good shooting. Steel on Target!

Soldiering and Soldier Education

by Sergeant Major Douglas K. Merrill

Many challenges lay ahead as the Army continues to deal with change. Of great importance is the challenge to train and sustain the force in the art and science of modern warfare. The education of present and future enlisted leaders is critical to the Army's mission. One piece of that education is civilian education opportunities.

The Army has long recognized the value of civilian education and has placed continued importance on a soldier's level of civilian education when considering promotions. Combat arms soldiers have always been at a disadvantage regarding their opportunities for civilian education. The focus of this article is to suggest ways to provide greater opportunities for civilian education to the soldiers in combat arms.

The responsibility for training, sustaining, and educating soldiers remains the commander's. The two broad areas in the civilian education arena that commanders must aggressively pursue are creating programs and providing encouragement to soldiers. These areas of responsibility can be divided into two levels: 1) the company/troop commanders and first sergeants who support/implement programs, and encourage soldiers to further their civilian education and, 2) the commander/command sergeants major at battalion, brigade, and above who design programs that allow the soldiers the time to pursue their educational goals.

There are two methodologies that units can pursue in providing educational opportunities for soldiers, ei-

ther: 1) formally, such as XYZ, or the red, amber, green cycle, and 2) informally, but supported by the command.

An example of a working formal program is at 3-64 Armor, Schweinfurt, Germany. Their program builds on the division's red/amber/green training cycle addressed in the division's long-range training guidance. The brigade and battalion have blocked out training time for civilian education and live by the training plan. Another unit in that division worked through the education advisor to obtain courses from their supporting colleges and universities that could concentrate the academic studies of one semester into 2-3 weeks. With the unit supporting their soldiers by allowing them to attend school during the work week, soldiers were able to complete a semester of studies during the unit's Z period. Such formal programs allow soldiers to plan their education and know that ample time will be provided for course completion.

Similarly, the 1st Armor Training Brigade's Steel Soldier University at Fort Knox, Ky., provides another innovative approach. The commander and command sergeant major of 1st ATB work together with their subordinate commands to provide their soldiers opportunities to attain their educational goals. This effort is focused on providing college-level classes to attain an Associate of Arts Degree within two years.

This formal program requires pre-testing in English and math to determine who can participate immediately

in the degree program and who requires tutoring assistance prior to entrance. This pre-testing is done with the assistance of a local community college. Once pre-testing is completed, soldiers are placed into three groups of 35 each. The college then conducts the classes during lunch for an eight-week period.

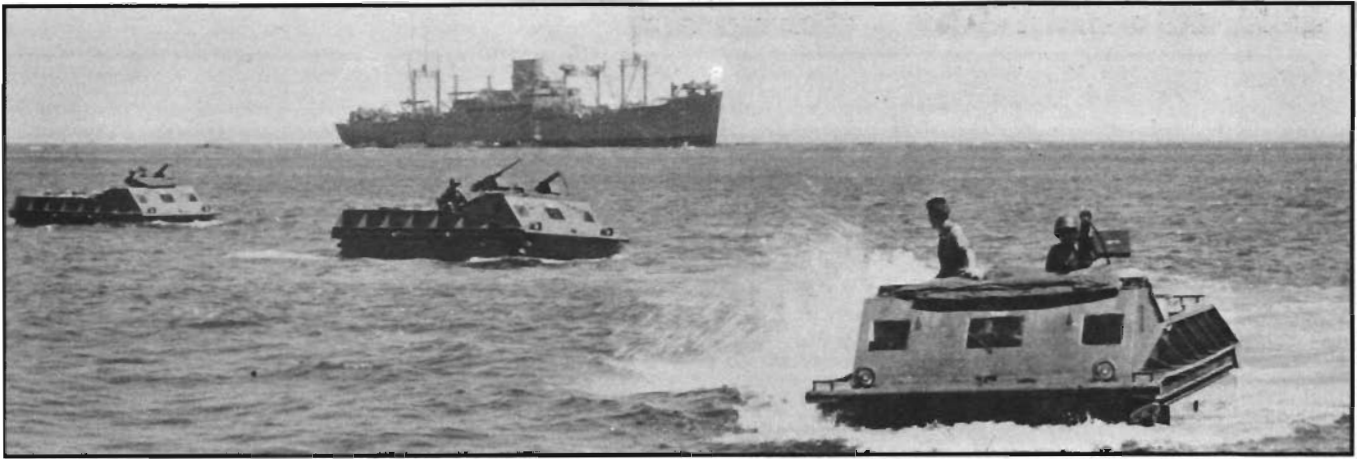
Once the soldier enters the class, through tuition assistance or the GI Bill, that class becomes his place of duty. After completion of 12 credit hours, the college evaluates the soldier's career record for applicable credit hours.

Initially, the cost of books is defrayed with government funds. In the future, this cost will be supported by unit fund raisers. All books and materials will be recycled to future students at no cost. The potential exists that no student will pay for books during the entire program.

Informal programs fall into two categories. One program allows any soldier to attend college-level courses consistent with the unit's full mission requirement. The soldier, however, must make arrangements to make up course time missed due to mission requirements. This works if the commander and the first sergeant believe in the program and the soldier is highly motivated.

The second informal methodology allows a percentage of soldiers to enroll and complete courses regardless of the unit's mission. This method al-

Continued on Page 42



LVT-1s carry reinforcements to Guadalcanal during WWII.

The Assault Amphibian Vehicle (AAV): Its Past, Present and Future

by Captain William P. McLaughlin, USMC

In the force structure of U.S. Army and Marine Corps armored/mechanized units, there is one vehicle that remains unique to the United States Marine Corps — the Assault Amphibian Vehicle (AAV). The purpose of this article is to explain its history, present day and future use.

The Assault Amphibian Vehicle was invented because of an operational requirement by the Marine Corps in the 1920s and 30s for a vehicle that could transport troops from ship to shore, cross coral reefs, and transition to limited land operations. Early experiments tested the Christie Amphibious Tank in 1924 and the Vickers-Armstrong Light Amphibious Tank in 1932. The interest in an amphibious tank stemmed from the need to have first wave firepower in an amphibious landing to bridge the gap between naval gunfire and close air support.¹ The Corps rejected both vehicles because of poor water speed and buoyancy.

The gap still existed, and interested Marine, Army and Navy officers searched for a replacement. In the winter of 1937-38, a U.S. Navy admiral passed to the commanding general

of the Fleet Marine Force an article in *Life* magazine about an extraordinary new rescue vehicle. It was the "Alligator," designed by Dunedin, Florida engineer Donald Roebbling to rescue stranded victims of hurricanes which were so common in the Everglades region.²

News of this vehicle was sent to the Marine Corps Equipment Board via the commandant. In the spring of 1938, an official visit and report of this board prompted a recommendation to the Navy's Continuing Board of Landing Craft to procure an experimental model of this craft for landing exercise testing. This was initially rejected by the Navy due to lack of funds. Mr. Roebbling was impressed by the Marines' interest in the military value of his vehicle and continued to develop it. It incorporated riveted, all-aluminum construction, with various V-8 power plants and a new revolutionary track that propelled the vehicle on land and in water. By August 1940, an improved version, known as the "Alligator," impressed Navy and Marine officials enough to allow allocation of funds to purchase a test vehicle. Army, Navy and Marine offi-

cialists were so impressed that the Navy negotiated a contract for delivery of 100 all-steel vehicles, to be known as Landing Vehicle, Tracked (LVT), based on Marine Corps' recommendations.³

The Food and Machinery Corporation (FMC), which had assisted Mr. Roebbling previously, entered into the formal business of producing LVTs at two locations, Lakeland, Florida, and Riverside, California. A Marine training unit was established in May 1941 to provide a cadre to train crewmen and mechanics. After training, personnel were sent to newly forming units of the 1st Amphibian Tractor Battalion (AmTrac), part of the 1st Marine Division.

A need was still seen to produce an armored amphibian with a turret and 37-mm gun to provide firepower to initial waves of an amphibious landing. Designs were begun in the fall of 1941, but were not adopted, nor did production begin, until the war broke out. So, at the beginning of the war, only one version, the LVT(1), a cargo variant armed with .50 and .30 caliber machine guns, was available for deployment overseas.



Strangely enough, the first wartime use of the LVT(1) was not as a troop carrier in the initial wave at Guadalcanal, but as a cargo carrier, shuttling supplies from ship to shore. Its support was invaluable, due to the rough jungle terrain and lack of wheeled vehicles. The LVT(1) moved and assisted installation of a bridge to cross the Tenaru River, towed artillery into place, and evacuated wounded. Though not intended to be an assault vehicle in this operation, it was used to suppress enemy positions with its machine guns so infantry could attack and to cover the withdrawal of wounded.⁴ The Marines of the 1st Amtrac Battalion also served as infantry, conducting foot patrols and dismounting machine guns during the critical dark days of battle around Henderson Field when the Marines fought to retain a tenuous foothold.

While the LVT(1) was proving its mobility and versatility at Guadalcanal, two armored versions were being produced in the United States. An improved cargo model was developed with a stronger engine and greater



cargo capacity, named the LVT(2) ("Water Buffalo"). Its design helped to produce the LVT(A)2 and the LVT(A)1. The LVT(A)2 was simply an armored version of the LVT(2), bearing heavier armor plate and periscopes for crew survivability. The LVT(A)1 had a chassis similar to the LVT(A)2, but with an M3 light tank turret. The turret was power-operated and the gun gyro-stabilized to increase accuracy while shooting on the move. It was armed with a 37-mm M-6 gun, one coaxially-mounted .30 caliber machine gun, and two ring-mounted .30 caliber machine guns.⁵

Unfortunately, these armored versions did not arrive in time to assist in the first combat assault of LVTs at Tarawa. Secret tests at the behest of

Marines and their LVT (A)4s, above, re-enact WWII on Vieques Island, off Puerto Rico, in 1954, during the filming of the Hollywood epic "Battle Cry."

At left, an LVT (A)1 rolls down the ramp of a Landing Ship Tank during the recapture of the Philippines, 1945.

General H.M. Smith (CG, V Amphibious Corps) in May and October of 1943 convinced Marine planners that the only type of craft suitable for crossing the extremely difficult coral reefs ringing islands in the Central Pacific was the LVT. No other vehicle could offer protection and mobility in heavy surf with full loads of men and equipment and rapidly transition from water to land operations.⁶

Second Marine Division was the unit designated to assault Tarawa. Its supporting 2nd Amphibian Tractor Battalion, commanded by Major Henry Drewes, was in a difficult situation. It had for the landing, 75 LVT(1)s salvaged in New Zealand after supporting units in the Solomon Islands. These vehicles were unarmored. Drewes located pieces of boiler plate at a local New Zealand Ford Motor Plant. He had these welded to the front and sides of LVT(s) and ensured each vehicle had two .50 caliber machine guns and one .30 caliber machine gun.⁷ Fifty LVT(2)s (not LVT(A)2s) were shipped from San Diego, Cali-



LVT(A)4, seen here during a 1955 maneuver.

formia, to Samoa, where a company of 2nd Amtrac Battalion prepared these vehicles in a similar manner.⁸ So, for the assault, 125 vehicles were ready, though not all were operational for the landing.

The LVT saved the 2nd Marine Division's at Tarawa. The tide was low, and the vehicle was the only craft able to reach the shore and return to a ship with wounded and to embark follow-on waves. It landed the majority of the assault troops in the first three waves. Those Marines unfortunate enough to ride in flat-bottomed LCVP boats had to walk 500 yards from the reef to the beach through chest-high water. Thirty-three hundred casualties resulted. The need for more LVTs with better armor and an armored fire support variant was

one of the valuable lessons learned at Tarawa.⁹

In the spring of 1944, Amphibian Tractor Battalions were removed from Marine divisional control and retained at corps level for better coordination and use in landing operations. In October 1943, the USMC and U.S. Army began raising their first Amtank battalions. The Army called them Amphibian Tank Battalions, while the Marines called their units Armored Amphibian Battalions.

The first U.S. Army Amphibian Tractor Battalions were raised concurrently with the new Amtank battalions. Priority of Amtrac deliveries in the war had initially been given to the Marines. However, U.S. Army units in the Southwest Pacific recognized the vehicle's utility. In October 1943,

the initial Army battalions were formed at the U.S. Army Amphibious Training Center, Fort Ord, California. They were formed along lines similar to existing Army mechanized infantry and armor units. Although this vehicle is more closely associated with the U.S. Marines, it is worth noting that the U.S. Army formed more amphibian battalions than the Marines (seven "Amtank" battalions, vice three Armored Amphibian, and 23 Amtrac, vice 11 Amtrac battalions for the Army, receiving a total of 55 percent of all Amtracs delivered to 40 percent delivered to the Marines).¹⁰ Their use will be discussed further later in this article.

The next use of LVTs, amphibian and "Amtank" versions, was in the Marshall Islands campaign. Both the

At right, an LVT(A)4 provides fire support during the Korean War, September 1950.



4th Marine Division and the 7th Army Infantry Division used amphibians and "Amtanks." The only variation was in the tactical employment of the armored amphibian or "Amtank." The Army chose to anchor its "Amtanks" on the flanks of the landing beaches, preceding the troop assault waves. This prevented them from being masked by landing vehicles and allowed assault waves to get full use of their machine guns. It looked almost like a large "V." This created less confusion than the Marines' employment of the LVT(A)1. The Marine Armored Amphibians preceded the troop-carrying waves and sometimes could not land. They had to remain offshore until troop-carrying LVTs could clear rubble and dug-in infantry. Where Armored Amphibians could get ashore, they were very successful. Marine adoption of a variant of the 7th Infantry Division's "V" was later highly successful in the capture of several atolls in the Marshalls Chain.¹¹

The biggest lessons in Amtrac employment were made in the Marshalls. They covered the full range, from Armored Amphibian use, to coral reef crossing by the rugged LVT(2) and LVT(A)2, to fire support lessons of the LVT(A)1. A need was seen for a troop carrier with a cargo ramp and better bilge pumps. The LVT(A)1 was found to be an effective fire support vehicle, but the direct fire 37-mm gun forced some commanders to use it like a tank. It definitely was not capable of that same mission, being too thinly armored. The decision was made to go to an upgunned version, with a 75mm capable of indirect fire as well as direct.¹² Some Army Amphibian crews adapted LVT(A)2s and LVT(A)1s to carry flamethrowers, 37-mm automatic cannons, and 4.5-inch rocket launchers. The Marines also experimented with these variants in

the Marshalls, but the limited range of the cannons and flamethrowers were not worth the effort to mount them. It was also found that the Rocket-Launching Landing Craft Infantry (LCI) was more effective in amphibious fire support.¹³

So, improvements at FMC provided U.S. forces with the LVT(4) and LVT(A)4. The LVT(4) had a ramp which allowed easier loading and unloading of artillery, jeeps, etc., giving added capabilities to the first assault waves. The LVT(A)4 was an assault gun/fire support vehicle armed with a 75-mm howitzer which was not gyro-stabilized. This meant that for the rest of the war, in the Marianas, the Pa-

laus, Iwo Jima and Okinawa campaigns, the gun could be used for direct fire upon landing, but as an indirect fire assault gun once ashore and after M4 Sherman tanks were landed. (The M4s could better withstand Japanese artillery in direct fire than the LVT(A)4). The rest of the war proved the LVT's worth as a troop and cargo carrier, fire support vehicle, and MEDEVAC carrier in ship-to-shore and coastal range in island campaigns. The LVT was only used as a mechanized troop carrier in conjunction with tanks in a few campaigns, Okinawa being a notable example.

The U.S. Army also used the LVT in a similar role ashore in the Philip-

Amphibian Tractor Units That Made Major Landings in World War II*

U.S. Marine Corps

1st Amphibian Tractor Bn
2nd Amphibian Tractor Bn
3rd Amphibian Tractor Bn
4th Amphibian Tractor Bn
5th Amphibian Tractor Bn
6th Amphibian Tractor Bn
8th Amphibian Tractor Bn
9th Amphibian Tractor Bn

1st Armored Amphibian Tractor Bn
2nd Armored Amphibian Tractor Bn
3rd Armored Amphibian Tractor Bn

U.S. Army

708th Amphibian Tank Bn
534th Amphibian Tractor Bn
715th Amphibian Tractor Bn
773rd Amphibian Tractor Bn

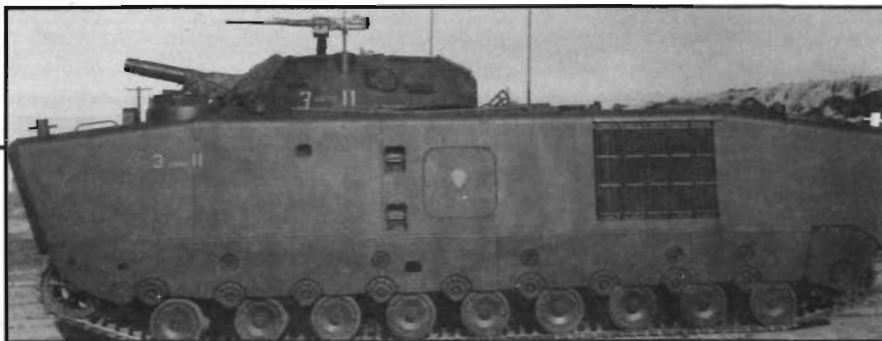
*From Croizat, Victor J., COL, USMC (Ret.), ACROSS THE REEF The Amphibious Tracked Vehicle at War, Appendix 2, pp. 243-244, Sterling Publishing Company, New York, N.Y., 1989.

pinges after landing in Leyte, Mindanao, and Cebu. A highly unique, but not well known, use was in a raid to liberate American POWs and internees in a combined operation, linking up with guerrillas and the 11th Airborne at Los Baños. (This sounds more like a modern evacuation operation than an event of 45 years ago!)¹⁴

The Australian Army also used LVTs in the Pacific, with its 1st Amphibious Armoured Squadron and 1st Australian Amphibious Tracked Vehicle Platoon employing them at Balikpapan, Borneo, in July 1945.¹⁵ The British used limited numbers of Lend/Lease "Buffaloes," as did the Chinese in the China-Burma-India theater.

Europe also saw limited use of LVTs by the U.S. in Operation TORCH in North Africa, and in Italy, crossing the Po River in joint U.S./U.K. operation in March-April 1945. The British effectively used LVTs in the Netherlands coastal regions, seizing Walcheren Island and South Beveland Island to gain control of Antwerp. The LVT was also effectively used by the British in crossing the Rhine River in March 1945.¹⁶

At war's end, two variants emerged but did not see combat until Korea. An improved cargo carrier emerged in 1949. It had a rear loading ramp for troops instead of open cargo bays, with an improved weapons mount employing a cupola. The LVT(3) was introduced on Okinawa but the LVT(3)C was used in Korea, functioning more as an armored personnel carrier. The other variant added was the LVT(A)5, a version of the LVT(A)4 with gyro-stabilization. Donald Roebling, the inventor and designer, furnished all of his wartime designs without compensation. President Truman recognized him with a meritorious citation for his unique contributions to victory.



The 1950s brought the larger LVT-5/6 series, later used widely in Vietnam. The vehicle above is the LVTH-6 version, with 105-mm howitzer. In photo below, 3d Marine Division "AmGrunts" in an LVT-5 roll ashore in Operation PIRANHA, September 1965, along the Vietnam coast.



LVT(3)Cs and LVT(A)5s were used in the 1950 Inchon landing and subsequent Han River crossing to re-take Seoul. It proved its combat versatility there, and in the evacuation of Hungnam Harbor after the 1st Marine Division's breakout from encirclement at the Chosin Reservoir.¹⁷ The rest of the war saw the LVT(A)5 as self-propelled artillery. Some use by riverine patrol units and economy of force patrols, with tanks and dismounted crewmen, once again proved the amphibians and their crews as versatile fighters.

In 1950, the LVT was first used in a war on the Asian land mass. The French used LVT(4)s and LVT(A)4s in their amphibious groups. The French Foreign Legion raised the 1st Legion Cavalry Regiment in 1948, and the 1st Amphibious Assault

Group in 1950.¹⁸ Some French LVT(4) variants were armed with 75-mm recoilless rifles, 40-mm automatic cannons, and flamethrowers, in addition to its machine guns. These vehicles were used in conjunction with other amphibious vehicles, like the DUKW ("Duck") and M29C ("Weasel") to provide mobility where boats or normal land vehicles could not go in the coastal and river regions of Indochina.¹⁹ Even after the French lost in Indochina, France retained enough stocks of LVTs to land the 1st Foreign Legion Parachute Regiment and 3rd Marine Commando at Port Faud in the Suez Crisis of 1956.²⁰

The United States entered the Vietnam War with the LVT-5 series, first introduced in 1953. It was a radical departure into larger employment of the LVT. A troop carrier, the LVTP-5; a

fire support vehicle, the LVTH-6; a command and communications vehicle, the LVTC-1; an air defense vehicle, LVTA-1; a recovery vehicle, the LVTR-1; and a combat engineer/minelfield breaching vehicle, LVTE-1, were to comprise the LVT-5 series of Amtracs. The basic design of each was to be around 35 tons unloaded and the personnel variant was to carry 30-34 combat-armed Marines. This was nearly double the complement of previous LVTs.²¹

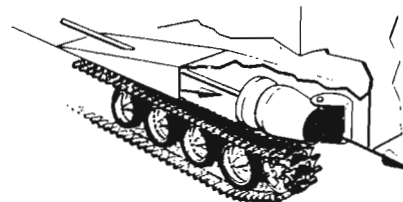
The LVTP5 and LVTH6 production models were successful, so several LVTP5s were converted to C² vehicles and no prototypes were built. A prototype LVTA-1 was built, but not adopted by the Marine Corps. A limited number of LVT(R)1s and LVT(E)1s were built. The LVT(E)1 had a mine plow and rocket-propelled line charges, and the LVT(R)1 had two winches, each capable of pulling 45,000 pounds, a welding rig, crane and other maintenance equipment with a single line. The LVT(C)5 could send and receive on seven channels and monitor four, and it had enough

space for chairs and map boards. It was used as a mobile command post ashore, as well as in amphibious landings. The LVT(H)6 mounted a 105-mm artillery piece to provide fire support ashore.

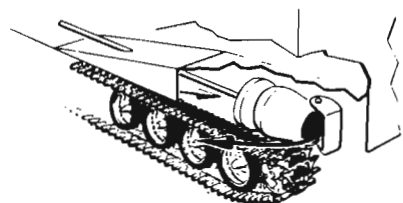
The LVT(P)5 series carried out a variety of missions in Vietnam, from amphibious assault landings (relatively unopposed, unlike earlier use), overland resupply, fire support, C², and in swampy riverine and coastal areas. Though an aging vehicle, it was usually operationally at 80 percent availability due to superior sustainment by maintenance and support units. LVT operations were also known for the use of Amtrac crewmen as infantry, in addition to regular duties, and from this came the nickname "AmGrunts." The LVT(H)6 also won praise from Marine infantry for its endurance and

How the LVT(P)7 Maneuvers In Water

STEERING AND REVERSING CONTROLLED BY DEFLECTOR AT REAR OF PROPULSION UNIT



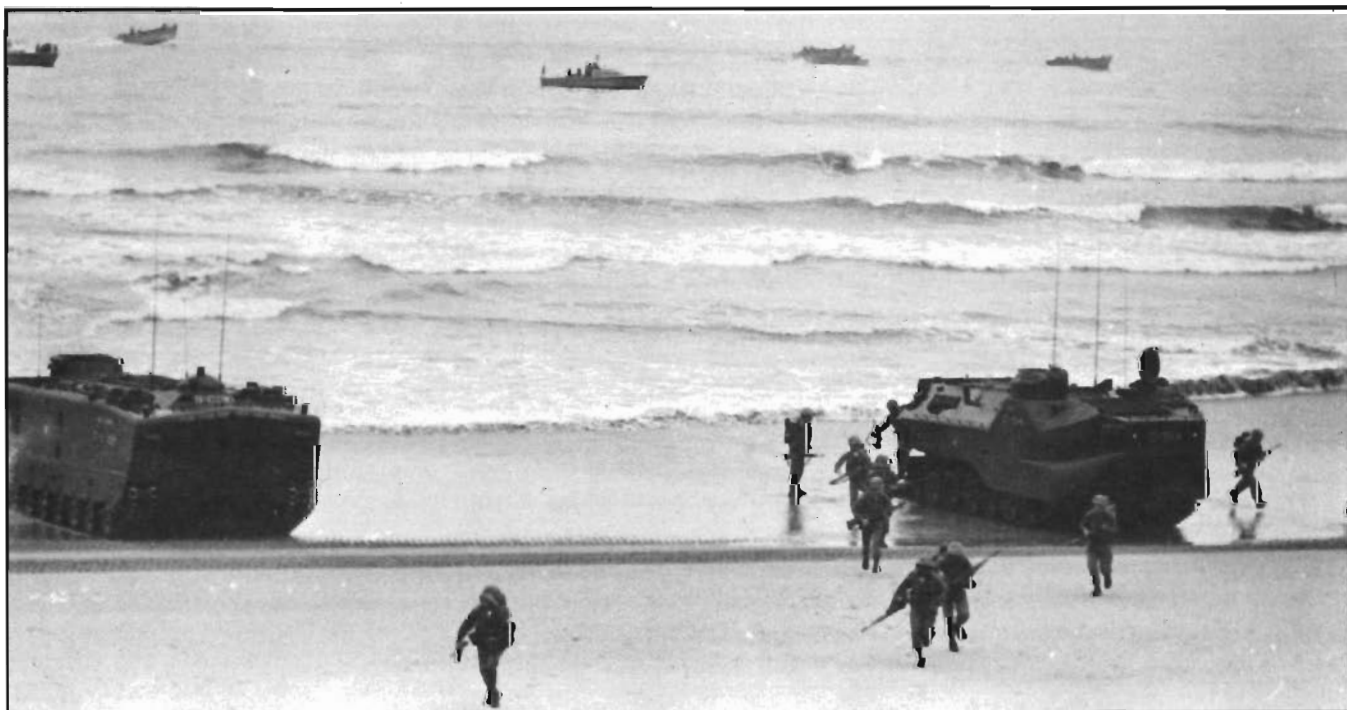
FORWARD THRUST



STEERING AND REVERSING

versatility in support of combat operations.²²

A severe drawback of the LVT(P)5 that was noted (and was common with M113 APCs of the era), was the highly flammable gas tanks in the "belly" of the vehicle, vulnerable to mines. Infantry preferred to ride on



Marines maneuver from the sea as the then-new LVTP7 is tested, side by side, with its predecessor, the LVTP5A1.

top of the vehicle with sandbags piled high to protect them. This and other problems, such as low water speed and maneuverability, prompted the development of a new series of LVTs.

The LVT(P)7 series emerged around 1972. It had a recovery variant LVT(R)7 and a C² variant, the LVT(C)7. It was more maneuverable and faster in the water, using a water-jet propulsion system in water and tracks for movement on land (Earlier LVTs used their tracks for water and land propulsion). It returned to a rear-opening cargo ramp, like the LVT4, vice front-opening on the LVT(P)5. An engineer variant was developed but unfortunately not adopted. Unlike the earlier LVT(H)6, which was heavily armored, the LVT(P)7 series was aluminum, like the M113 APC.²³ This gave more buoyancy and easier maintenance, given an original operational requirement of 80 percent water operations and 20 percent land operations. Despite the introduction of "vertical envelopment" techniques of landing one force by helicopter and another across the beach by LVT, the LVT(P)7 is a durable, all-weather vehicle. It is the only truly amphibious vehicle in the world, capable of surviving 10-foot plunging surf in the surf zone and underway launch by amphibious ships at sea (including nighttime operations).

However, around the late 1970s, the U.S. realized it needed a rapid deployment force capable of operating in a mechanized desert environment in the Middle East. The Marines were the best force, with a task-organized package, to be inserted into such an environment. The only APC available was the LVT(P)7. It was introduced as a personnel carrier at the Marine Corps Air Ground Combat Center, Twentynine Palms, California, to carry infantry in combined live-fire exercises with tanks, artillery and air.

An operational commitment also rose to produce a light armored vehicle to perform "picket" and reconnaissance duties on a rapidly moving

modern battlefield. This led to the Light Armored Vehicle (LAV)25 series.

The experiments in this area and in NATO exercises showed Marines that more improvements were needed to make the LVT(P)7 more survivable. A search began to produce the LVT(P)7A1 model.

Before designs could be implemented, let us discuss the LVT(P)7 in combat. These vehicles again proved their versatility. Example missions included: landing surface assault elements of all Marine Amphibious units; driving through small antipersonnel bomblets (which were ineffective against buttoned-up vehicle personnel) to allow pathways for engineers and EOD to clear routes of communication; providing logistical resupply and fast reaction reinforcement of combat outposts and isolated strongpoints (often in conjunction with Marine tanks); providing attack by fire capabilities against hostile forces with its .50 caliber machine gun; humanitarian evacuation of civilians in a mountain snowstorm; and MEDEVAC of wounded U.S. Marines. Though not armored, the vehicle did provide some protection against small arms fire; crews covered their vehicles with sandbags and wire mesh to protect against rockets and fragmentation.²⁴ Marine Amtrac and infantry leaders learned when to employ the vehicle as personnel carriers, not fighting vehicles! The Italian San Marcos Naval Infantry Battalion also used their LVT(P)7s in similar roles as members of the Multi-National Force in Beirut.²⁵

In Grenada, the LVT(P)7 was again used as a personnel carrier to rapidly move as part of a mechanized combined arms task force to seize inland objectives, such as in the relief of SEALs at Governor General Scoon's House,²⁶ and the seizure of St. George, Fort Frederick, and Richmond Hill Prison. LVTs provided an envelopment by landing a force over the beach into the rear of the enemy.

Fortunately, for the LVTs and the M60A1s, as well as the light Army airborne forces, there were no tanks or antitank capabilities on the island. (The platoon from "A" Company, 2nd Assault Amphibian Battalion did capture a BRDM-2, which is now in the Marine Air Ground Museum in Quantico, Virginia.)²⁷

The Argentinians, in their 1982 invasion of the Falkland Islands, used LVT(P)7s to land their first wave of Naval Infantry. Unfortunately, they did not land tanks or dismount the infantry early enough to clear routes, and lost one vehicle to antitank fire by defending British Royal Marines.²⁸

The U.S. Marines knew they could not produce a completely new vehicle until the late 1990s or the year 2001. So they began what was called the Service Life Extension Program (SLEP). At about this time, the Marine Corps decided to designate these vehicles as "Assault Amphibian Vehicle" or AAVs. This mind-set, plus new tactics, made designers think of ways to enhance the vehicle's capabilities as a personnel carrier as well as an amphibious vehicle.

The program that laid the groundwork for this was SLEP. This involved the delivery of some completely new vehicles, but concentrated mainly on vehicle rebuild. An electronically-powered weapons station with external smoke grenade launchers was added, instead of the hydraulic-powered station of old. A new, more powerful V-8 turbocharged Cummins diesel engine replaced the earlier Detroit Diesel. A smoke generation system was incorporated. Nonintegral fuel tanks replaced the LVT(P)7's integral one. Suspension was improved, with a capability to provide better trim by engaging tracks while powered in the water by the water jet propulsion system. Also added was the capability to provide secure voice communications. A state-of-the-art instrument panel provides easier control and better warning systems than the old vehicle.²⁹

With all these product improvements, what does it mean for the future of the AAV?

The PIP is to keep the AAVP7A1 series around until 1999-2004.

All examples of the LVT(P)7 received upgrades and became the AAVP7A1 series. Most notable was the development of state-of-the-art communications gear in the AAVC7A1.

This vehicle began to be fielded in the operational forces around 1984. It has been deployed in extreme climates, including the snows of Korea, Norway, and Alaska, the jungles of the Philippines to South America, the deserts of North Africa, the open, rolling ground of Turkey, and the European plains in Italy, France, Northern Germany, and Denmark.

In 1986, fielding of an Ungunned Weapons Station (UGWS), employing the MK19 40-mm Auto Grenade Launcher and the M2 HB .50 caliber machine gun, replaced the M85 .50 caliber machine gun, but still retained electric drive and smoke grenade launchers.

In 1987, a noteworthy event was the fielding of the P-900 applique armor kit. This kit provides a two-layer protection on the exterior of the vehicle hull, acting like "chain mail" to divert incoming rounds. Another applique armor kit being fielded is Enhanced Applique Armor Kit (EAAK). This will add 4,200 pounds to the vehicle but provides side protection up to 14.-5-mm AP rounds at 300 meters and overhead armor protection from 155-mm airbursts 30 meters over the vehicle.³⁰

All these improvements (UGWS, P-900, and EAAK) prompted funding for a Product Improvement Program (PIP) to carry the AAVP7A1 series forward to the years 1999-2004, when a replacement can be fielded. In addition to ensuring that UGWS and applique armor is fielded, PIP also will fund a Bow Plane Kit to enhance water operation with the added armor, a Magnetic Heading System, Automatic Fire Sensing and Suppression

System, improved transmission, and Advanced Propulsion System.³¹

In addition to these improvements, the AAV has also managed to enhance mobility on the modern combined arms team, despite no fielding of an engineer variant since the LVT(E)1. Since around 1983-84, the Marine Corps bought and fielded a Mine Clearing Line Charge (MICLIC) which could be towed by AAVs or tanks. AAVs are better suited for this since they can carry an engineer squad.

Another system being produced to provide battlefield mobility via the AAV, is the Catapult Launched Fuel Air Explosive (CATFAE) surf zone mine clearing system. This incorporates a launcher with 21 fuel-air explosive rounds, and a fire control system installed in the troop compartment of an AAVP7A1. This system would fire 234-pound propylene oxide fuel-air explosive rounds onto minefields, thereby destroying surface-laid mines or detonating mine fuses through overpressure. CATFAE can break mines in the surf zone while firing from afloat (while moving up to 6.2 mph) or ashore (up to 15 mph); it can create a lane up to 20 meters by 300 meters in 90 seconds or less, and it can fire either single rounds or volleys of up to 21 rounds.³² This system will be fielded with 12 units divided among the three AAV battalions by fiscal year 1995.

To complement MICLIC and CATFAE, mine plows adaptable to the AAVP7A1 series are being purchased in conjunction with another buy to acquire mine plows for M1A1s.

With all these product improvements, what does it mean for the future of the AAV? The PIP is to keep the AAVP7A1 series around until 1999-2004. The problem of replacing

the AAV is the change in doctrine and tactics. Marine and Navy planners predict an increase in Over The Horizon (OTH) landings, using high speed water vehicles like the Light Air Cushioned Landing Craft (LCAC). Many planners think that the LCAC would override the need for an Advanced Assault Amphibian Vehicle (AAAV). However, the AAAV would satisfy many mission area needs by providing mobility, firepower and armor protection to embarked personnel during the ship-to-shore portion of an amphibious assault, as well as in subsequent operations ashore.³³

This would mean a radical departure from the present AAV. It would mean a high-speed water vehicle capable of being launched OTH, out of range of enemy weapons systems, and transitioning to personnel carrier on land. Designers are working on such a prototype, planned to be smaller than the present AAV. It would have a main gun similar to the LAV or M2/M3 Bradley with armor providing protection up to 14.5-mm machine gun fire at 300 meters. It would be capable of transition from high water speed travel to tracked vehicle operations on land. It would provide forcible entry (or assault) onto critical beaches. This would clear the way for LCAC and conventional landing craft to land LAVs, to push out forward as a security force for the beachhead, and for the M1A1s to marry up with AAVs and infantry ashore to create mechanized combined arms task forces if the combat environment dictates it.

Testing continues on such a vehicle. Recently, AAI Corporation and General Dynamics, in conjunction with the Marine Corps, produced a High Water Speed Technology Demonstrator (HWSTD) of the AAAV. It broke the water speed record for a tracked amphibious vehicle set by the "Alliga-

tor" in 1940, or 10 mph, by tripling it.³⁴ This is the first step taken in developing the AAV.

In summary, we have seen a unique tracked vehicle that is truly amphibious, providing versatile capabilities afloat and ashore. The history, present use, and future of the Assault Amphibian Vehicle shows us that it still meets the operational needs of our force structure today and in years to come.

Postscript: "Ships of the Desert"

When this article was originally written, I was a student at the Armor Officer Advanced Course in July 1990. Since the first draft of this article, I have had the privilege of observing the AAVP7A1 vehicle in combat in Operation DESERT STORM, while serving as the commanding officer of Company D, 2d Assault Amphibian Battalion, 2d Marine Division.

Though this vehicle was primarily designed for amphibious assault from "ship-to-shore," it performed extremely well as a "Ship of the Desert." It provided mobility for engineer and infantry units for the ground assault and subsequent liberation of Kuwait City.

A unique application of this vehicle was the fielding of the Mark 154 Modification "O" Linear Mine Clearance Kit. This is an engineer asset that is internally mounted in the vehicle. It consists of a rocket and linear demolition charge system, similar to the MK155 MICLIC towed variant. A hydraulic system raises the rocket before firing. Once fired, the line charge deploys on the ground, creating a breach lane through the obstacle. Unfortunately, a mineplow has not been fielded for the AAV (one is currently being developed and tested). In the Kuwaiti Theater of Operations, Marine forces used M60A1 and M1A1 tanks to proof the breach lane.

The AAVP7A1 was also embarked with the 4th and 5th Marine Expeditionary Brigades (MEBs). These units

In the Gulf War



This AAVP7A1 with Mark 154 mine-clearing system, similar to the MICLIC, itself hit a mine in the breaching of the Iraqi defenses.



Three abreast on an Army-operated LCM, the D Co. vehicles begin the trip home from Kuwait, underway from R'as Al Mishab to Al Jubail.

provided the amphibious "feint" for Central Command by constantly practicing amphibious landings prior to the ground war. The 5th MEB also conducted an administrative landing at R'as Al Mishab, Saudi Arabia, to reinforce the I Marine Expeditionary Force after the ground assault started.

For a vehicle that initially was designed for 80 percent water use and 20 percent land use, in my opinion, it held up remarkably well under desert conditions. These vehicles were a necessary mobility asset to equip our conventional line infantry. These vehicles are thin-skinned and, therefore,

it was necessary to complement it in the mechanized combined arms task force with tanks, combined antiarmor teams (scouts mounted in HMMWVs with additional mounted TOW sections), and light armored infantry units (LAV equipped).

The AAVP7A1 still remains in the Fleet Marine Force, executing traditional missions. In a recent review of *Jane's AFV Recognition Handbook*, Second Edition, by Christopher F. Foss (1992), I noticed that the Landing Vehicle Tracked or the Assault Amphibian Vehicle (modern USMC designation) lives on in service in

many variants and models in different countries. The older LVTP5 series remains in service in Chile, Philippines, and Taiwan. The LVTP7 remains in service in Argentina, Brazil, Italy, South Korea, Philippines, Spain, and Thailand. The AAVP7A1 is currently in use or being bought by the USA, Brazil, and Venezuela.

The Assault Amphibian Vehicle remains in use in the Fleet Marine Force as we speak. In December 1992, as the world watched the United States land in Somalia for "Operation RESTORE HOPE," AAVs from the Battalion Landing Team of the Marine Expeditionary Unit (Special Operations Capable) [MEU(SOC)] landed in Mogadishu.

The U.S. Marine Corps and U.S. Navy, in anticipation of future joint operations in the U.S. Armed Forces, will have to maintain the capability of Over The Horizon amphibious operations as the spearhead of U.S. forces into the littoral areas of various regions. This is the genesis of an evolving doctrine known as "Maneuver from the Sea."

The U.S. Marine Corps continues to develop an Advanced Assault Amphibian Vehicle (AAAV). AAI Corporation has produced a High Water Speed Technology Demonstrator (HWSTD), and its competition, the Food and Machinery Corporation (FMC), of San Jose, California, has also produced a high water speed test vehicle.

Only the future will show if a new variant will emerge. The successful combination of high water speed mobility and ground mobility is a technological challenge. If this feat can be accomplished, I know it would warm the heart of many an old "amtrac" soldier or Marine that fondly remembers his old reliable, versatile vehicle.

Notes

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¹⁵Zaloga, p. 24.

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¹⁹Croizat, Victor, COL, USMC (Ret.), *The Brown Water Navy, The River and Coastal War in Indochina and Vietnam 1948-1972*, Blandford Press, 1984, pp. 52-71.

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²³*Ibid.*, p. 259.

²⁴Personal interviews conducted by the author and veterans of the Beirut Multi-National Force Mission from 2d Assault Amphibian Vehicle Battalion, 2d Marine Division, Camp Lejeune, N.C., June 1984-December 1986.

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²⁷Tommell, Anthony Wayne, "Soviet Vehicle in Collection, Thanks to 2d AAV Bn," *Fortitudinae*, Marine Corps Historical Foundation, 1986, p. 21.

²⁸Zaloga, p. 43.

²⁹Food Machinery Corporation Technical Flyer "AAV7A1 Family of Assault Amphibian Vehicles," FMC Corporation, Ground Systems Division, Marine Corps Program, 1984, pp. 2-3, 6.

³⁰"Marine Corps Moves to Defeat Anti-Armor Threat," "News," *Marine Corps Gazette*, April 1990, p. 7.

³¹*United States Marine Corps, Concepts and Issues*, Headquarters, Marine Corps, February 1989, p. 3-8.

³²FSD Contract Award for CATFAE," "News," *Marine Corps Gazette*, March 1990, p. 4.

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³⁴"Double Time," AAI Corporation Advertisement, *Marine Corps Gazette*, April 1990, Cover, p. III.

Captain William P. McLaughlin was commissioned through the NROTC program at The Citadel in 1983. He attended The Basic School in 1983, and the Amphibian Officer Course in 1984. Upon assignment to the 2d Assault Amphibian Battalion, 2d Marine Division in 1984, he served as a platoon commander and S-3A. He also deployed to South America as the AAV platoon commander for AAV Platoon, Marine Detachment, United American States XXVII. In 1986, he was reassigned to Naval Station Guard, Marine Barracks, Norfolk, Va. This unit transitioned to Marine Corps Security Force Battalion Atlantic in 1987. He served as a rifle and weapons platoon commander for Fleet Anti-Terrorist Security Team Company and training officer for the Battalion Training Center. After attending Armor Officer Advanced Course at Ft. Knox, Ky., he served as CO, Company D, 2d Assault Amphibian Battalion, 2d Marine Division. He deployed to the KTO with his company. They supported the 6th, 8th Marine Regiments, and 2d Tank Battalion during the ground offensive. From August 1991 to March 1992, he served as a United Nations Military Observer for the Referendum in the Western Sahara, observing the cease fire between the Moroccan Army and the Fronte Polisario. He is currently the CO of H&S Company, 2d Assault Amphibian Battalion, 2d Marine Division, Camp Lejeune, N.C.

The Future Scout Vehicle: A DESERT STORM Endorsement

by Captain John K. Tien

Having introduced three different scout vehicles since the 1970s, the Armor Center has outlined characteristics of the next scout vehicle designed to take U.S. Army reconnaissance into the next century. In its white paper, "Armor 2000 — A balanced Force for the Army of the Future," the Armor Center said this vehicle — the Future Scout Vehicle (FSV) — should have the following characteristics: (1) self-defense weapon; (2) high mobility; (3) lightweight body design, (4) area surveillance tools; (5) long-range communication assets; and (6) NBC countermeasures.¹ Based on my DESERT STORM experiences as an armor task force scout platoon leader, I endorse these six characteristics of the FSV, as well as advocate adding three more features to the vehicle's design: (1) a maintenance design which enables the operator to fix forward without direct support assistance; (2) sufficient space on board for combat support and command and control assets; and (3) a built-in Identification of Friendly Force system to avoid fratricide incidents. Since the Armor Center published the paper on July 10, 1990, one month prior to the onset of Operation DESERT SHIELD, I believe I can now offer an updated and DESERT STORM-influenced endorsement of the Armor Center's concept of the Future Scout Vehicle.

The first Armor Center characteristic I endorse is the scout vehicle's self-defense weapon. My scout platoon consisted of three M113A2 Armored Personnel Carriers and three M901A1 Improved TOW Vehicles. I had the



Given the mission of visual reconnaissance in the Gulf War, with little need to engage the enemy with heavy firepower, the author's M113s proved surprisingly adequate. Its mobility and ease of maintenance also proved to be assets.

M2 caliber .50 machine gun, the Dragon system, and AT-4s in our store of quick-reaction weapons. In the high-speed mobile warfare of DESERT STORM, the M901A1 TOW launchers were basically ineffective; neither could we shoot them on the move, nor could we afford the stationary engagement time. Thus, we could not have quickly destroyed even an enemy armored personnel carrier. However, that was not our mission. In keeping with current doctrine, my DESERT STORM mission was to engage the enemy with visual reconnaissance and leave direct fire to other segments of the unit.

Therefore, although my platoon was limited in its direct fire destruction capacity, my battalion commander ensured that we were part of an advance guard that could provide quick reaction tank support. Likewise, when we were screening the flank, the flank tank company provided us with similar support. When the enemy engaged us on the screen line, it was either by tanks that were to the direct front at ranges greater than 3,000 meters or by indirect fire.

Clearly, given the proper support, I needed only self-defense weapons to

accomplish my forward and flank screen missions.

The Armor Center cannot, however, make the characteristic of a self-defense weapon a stand-alone one. If the Armor Center wants the FSV to go deep and stay deep, it must couple its self-defense weapon with the ability to escape enemy detection or, if need be, evade enemy direct fire. They must ensure that the vehicle possesses high mobility. This characteristic greatly contributed to my survivability on the DESERT STORM battlefield.

When our brigade fought on Medinah Ridge on 26 February 1991, our task force received enemy artillery across our flank. This artillery bracketed my scout screen line. The initial bursts hit 25 meters to both sides of three of my vehicles. Due to the high mobility of the M113-series vehicle, we were able to quickly push the screen line forward and then toward the main body to evade the enemy artillery. These evasion drills worked to keep the artillery from impacting too close to our thin-skinned vehicles and gave our direct support artillery enough time to use counterfire to neutralize the enemy artillery.

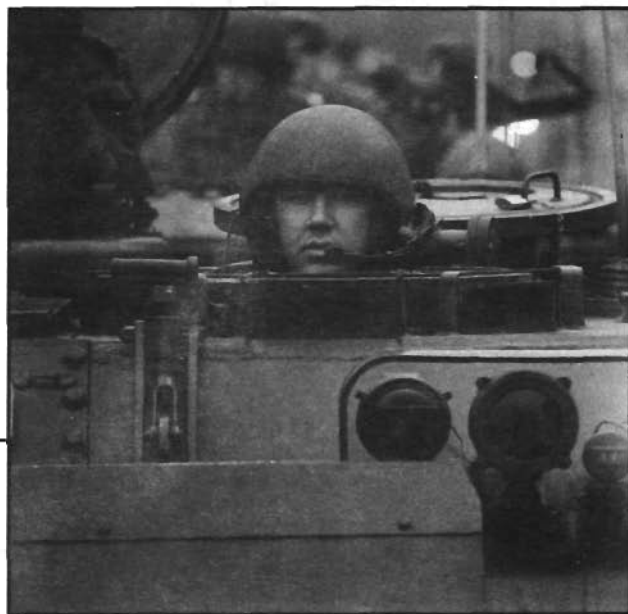
The M113's high mobility also came into play during a simple vehicle recovery mission during the cease-fire. My battalion commander tasked me to take a section of two Bradleys and one M113A2 75 miles north toward Basrah, Iraq, to recover a lost vehicle. The Bradley led until it hit an unexploded bomblet. The driver in the Bradley was too recessed from the front of his vehicle and could not see to maneuver around the ordnance-littered battlefield. On the other hand, my M113A2 driver, who sat six inches from the front of the vehicle, was easily able to bypass the danger areas. Consequently, I put my "protection-Bradleys" behind me and led the remainder of the mission, having the Bradleys follow in my M113 tracks. High mobility, therefore, was crucial to my vehicles' surviving on the DESERT STORM battlefields.

A feature that is often linked with high mobility is a lightweight design. Such a design was key to the M113 scout series vehicle's success in my task force for two reasons. First, twice as many M113s could go on the Saudi Arabian Heavy Equipment Trucks as M1A1 combat tanks. Consequently, upon my task force's arrival in Saudi Arabia, the task force commander chose my platoon to be the first combat force to leave Al Damman port for Tactical Assembly Area Thompson in the desert. Second, the 13-ton M113 has a three mile per gallon fuel efficiency compared to the .7 mile/gallon efficiency of the Bradley and .3 mile/gallon efficiency of the M1A1 tank. As a result, my platoon refueled

only once every 24 hours, whereas the Bradleys needed to refuel every 12 hours and the tanks every 6 hours. In summation, my scout platoon could have made the 300-kilometer VII Corps envelopment sweep without ever refueling. Thus the lightweight design of the M113 gave it an advantage over the larger combat vehicles of the task force in terms of transport and fuel efficiency.

What the Bradley lacks in weight and mobility relative to the M113, the Bradley compensates in terms of night vision as an area surveillance tool. The answer to the Bradley's night sight on the M113 or HMMWV is the PVS-7. This is not a satisfactory answer. The FSV must have a thermal night sight. The thermal sight would enable the scouts to perform during limited visibility times, which is when reconnaissance is most effective.

The fog, rain, and sand during DESERT STORM all degraded the capacity of the PVS-7. The first night of the ground war, I was lead element for the task force's move to its first assault position just south of the town of Al Busayah. There was a driving rain storm throughout the night which was accentuated by fog during the early morning. The brigade commander changed brigade formations from brigade box to brigade diamond. I had to flex left of the task force trains to our front and find the left flank combat unit of that same task force. The rain



The author moved his M113s forward when his leading Bradley hit an unexploded bomblet its driver couldn't see. With a driver's position high and in the front of the hull, it was easier to spot and avoid ordnance littering the battlefield.

totally washed out my PVS-7s, requiring me to send the lead scout vehicle to move within 50 meters off the flank of the front task force in order to correctly identify when we had reached his left flank. While we made it to the left flank and ultimately the assault position, we had discovered that our area surveillance capabilities were almost nonexistent during a heavy desert downpour at night. If the old scout adage of being the "eyes and ears" of the battalion is to hold true, then the FSV must have both excellent day and night surveillance capabilities.

Linked in with being the "eyes and ears" of the battalion, the scout platoon must be able to communicate what is seen and heard over extended distances to the battalion commander. FM 17-98 states that "because of the extended frontages and distances over which the scout platoon operates, it must rely heavily on effective communication techniques."² While, I cannot offer any technological solutions to the problem of long-range communications, I can endorse the need for such a capability based on my DESERT STORM experiences.

Due to the importance of staying under brigade command and control, my platoon's primary mission as we crossed the Iraq border was to screen forward and keep our task force linked with the brigade formation. On 23 February 1991, as 1st Armored Division left Forward Assembly Area Garcia north of the Tapline Road and south of the Iraq-Saudi Arabia border, a dust storm reduced our day vision capability to less than 50 meters. Within an hour, the lead tank company that was following my platoon had lost contact with my trail vehicle. For an hour I vectored the lead company commander to my position on the brigade's left flank with longitude and latitude readings.

The radio was also key at critical graphic control measure sites throughout the battalion's move. I was able to relay every phase line during the battle to the battalion commander enabling him to relay our unit's FLOT to the brigade commander. I was able to pass on key passage of lines and natural obstacle information during the battalion's movement across the Wadi Al Batin, the Tapline Road, and the Iraq-Saudi Arabia border. Our radio capabilities, however, were never challenged by any Iraqi electronic warfare; had the Iraqis jammed us, we would have been impotent in many of our missions. In short, without effective long-range communication assets, we would have failed the majority of our DESERT STORM missions.

Neither did the Iraqis challenge our NBC countermeasures during the ground battle. Similar to electronic warfare, NBC warfare would have rendered my M113-series scout platoon nonfunctional. While we could have survived a short-term MOPP4 environment, the M113 is not equipped to fight in an NBC environment, as is the M1A1 tank. Our answer to the M1A1's overpressure system was simply to go to MOPP4 as

the NBC trigger signals hit (e.g. yellow airbursts) and begin the standard M256 kit drills. Fortunately, Saddam Hussein chose not to employ such weapons, and we had to go to MOPP4 only twice during the ground war. Nevertheless, if the FSV is to go deep and stay deep on a future battlefield in which the laws of land warfare are ignored, the FSV must have effective NBC countermeasures on board.

In addition to the NBC countermeasures and other features the Armor Center lists in its white paper, I would advocate adding three more features to the vehicle: (1) the ability to fix forward, (2) additional load plan space, and (3) a built-in IFF capacity. Under the current doctrine, the scout platoon will go 4-6 kilometers forward of other friendly assets and even further if employed as part of a divisional cavalry or regimental cavalry troop organization. Given such a separation from its parent unit, the crew must often fend for itself in terms of maintenance support.

During DESERT STORM, my platoon had no attached maintenance assets, and in general, this was a satisfactory arrangement in terms of how we were employed within the formation. One of my vehicles, however, became separated from the task force when its engine malfunctioned and the M113 could not continue forward. After checking on the crew's condition and life support systems, I told them that follow-on maintenance support would recover them within 48 hours.

During the next 24 hours, the sergeant track commander bypassed the electrical fault and used green duct (100 mile per hour) tape to repair the worn fan belt in the engine. Consequently, he put his vehicle back into operation, albeit a reduced form of operation, and moved eastward until he linked up with another friendly unit for the remainder of the war. I do not offer this example as operator-

level maintenance doctrine, but rather more as a supporting argument to ensure the FSV's mechanical system is not so overly complex that the crew is stranded if just one electrical connection or computer board diode fails.

The FSV's design should also allow for the task force commander to task organize the scouts with additional combat support personnel and command and control assets without adding additional vehicles to the platoon. FM 71-2 states that the battalion commander will often task organize an engineer NCO with the scouts to assist in obstacle identification and pre-breach operations.³ FM 71-2 also states that a single forward observer can go forward with the scouts to assist in target identification and call for fires.⁴ My battalion commander task organized my scout platoon in accordance with both these concepts during DESERT STORM.

Consequently, I had to make room for two additional men, their personal gear, and their equipment. In the case of the engineer, I had each vehicle carrying half of a footlocker of C-4, TNT, and detonation cord. The FO brought three GVS-5s and two radios. While I was certainly pleased to have such combat support assets, I was already at full strength in terms of personnel. Moreover, I was at maximum space capacity with my own scout platoon combat load plan, which included dragons, AT-4s, and extra Class I, III, and V. In terms of command and control assets, four of my vehicles had the LORAN positioning system mounted, and I tasked all six of my track commanders with tracking the battalion's movement on their 1:250,000 map, which at 4 x 3 feet, covered the left wall of the M113. Given the scout platoon's mission to act as the forward security force for the task force, as well as provide accurate navigational intelligence, the FSV designers will need to attend to the space capacity and ergonomics



The M113's resemblance to other vehicles used by the enemy in the Gulf War made fratricide a disturbingly real possibility in the heat of rapid operations. The author argues that an effective IFF system should be a must on any future scout vehicle.

of having more than what the MTOE calls for in a scout platoon in terms of men and equipment.

The FSV designers must also deal with the biggest dilemma of the Gulf War: fratricide. Of all friendly vehicles in our task force, my scout platoon most closely resembled the enemy because of two reasons: (1) the positioning of my platoon forward and on the flanks of the unit, and (2) the enemy also had M113-like vehicles. Our unit attempted several solutions to the fratricide problem. We tried using the aircraft panel markers for day recognition and thermalized number 10 coffee cans on our antennae for night recognition. Both were only mildly effective because of the general field conditions.

Their ineffectiveness was particularly evident during one "fog of war" incident which occurred on 27 February 1991. Up until this day, my platoon had been the only force on the brigade's left and northern flank since the start of the ground war. On 27 February, however, the brigade commander moved the mechanized infantry task force to the left flank for further security. He swung them around in a wide arc (at approximately 45 degrees at a distance of 3,000 meters) to ensure that the infantry task force did not become entangled with my task force.

As the mechanized infantry task force's right flank tank company/team

oriented towards our M1A1 FLOT, one of the tank gunners immediately identified and lased to a column of enemy vehicles moving in from the northeast toward my task force's M1A1 FLOT. The tank commander, who was also the platoon leader, looked through his gunner's primary sight extension and identified the vehicles as definitely moving toward the friendly FLOT but could not confirm them as friendly or enemy. After calling the spot report in and closing in to a distance of 1,000 meters toward our M1A1 FLOT, the platoon leader was able to identify the vehicles as friendly. What both he and his gunner had seen was my scout platoon in an echelon left moving off the left flank of our M1A1 FLOT. This was not apparent to either soldier because of our movement formation, our undistinguishable vehicle form, and our lack of any easily identifiable friendly identification.

Other studies have proven that DESERT STORM made fratricide more probable because of our lack of good Identification of Friendly Force (IFF) markings and the distances at which we were engaging perceived enemy vehicles. Undoubtedly, the FSV must go forward with some system of IFF marking.

The Army wants a "ground scout vehicle that can penetrate undetected into areas under enemy control" during both "forward deployed and con-

tingency area operations."⁵ To do so, the army needs to make that vehicle light, mobile, and survivable. Survivability will depend on its ability to sustain operations independent of immediate task force support, escape enemy detection, and distinguish itself from enemy vehicles in the form of an IFF system. Based on my DESERT STORM experiences as a task force scout platoon leader, I endorse, with some additions, the Army's current direction it is heading with the Future Scout Vehicle.

Notes

¹*Armor 2000 — A Balanced Force for the Army of the Future*, U.S. Army Armor Center, Fort Knox, Ky., 10 July 1990, p. 14.

²FM 17-98, *Scout Platoon*, HQ, Department of the Army, Washington, D.C., October 1987, p. 2-60.

³FM 71-2, *The Tank and Mechanized Infantry Battalion Task Force*, Department of the Army, Washington, D.C., September 1988, p. 3-44.

⁴*Ibid.*

⁵*Armor 2000*, p. 14.

Captain John K. Tien wrote this article based on his experience as the task force scout platoon leader for 4th Battalion, 70th Armor, 2d Brigade, 1st Armored Division, which fought in the battle of Medinah Ridge during Operation DESERT STORM. He is a 1987 graduate of the U.S. Military Academy and received a degree in Political Science from Oxford University as a Rhodes Scholar. A graduate of the AOAC, AOBC, Airborne, and French Commando Courses, he served as a tank platoon leader, scout platoon leader, and battalion adjutant for 4-70th Armor in Erlangen, Germany. He is currently assigned to the 2d Armored Division at Fort Hood.

Time Management — The Combat Trains

by Major Daniel J. Klecker and Lieutenant Colonel Charles S. Kaune

"Go, gallop, and don't forget that the world was made in six days. You can ask me for anything you like, except time."

— Napoleon

Time is one of the most valuable resources of leaders and planners at all levels. It is a very limited and nonrenewable resource. Once used, it is gone forever. A key to success is to maximize the utility of this very limited resource.

In combat, effective time management is always a major ingredient to success on the battlefield. A principle cause of mission failure is ineffective time management. Experience at the Combat Maneuver Training Center has continually validated these premises.

The purpose of this article is to share some of the lessons learned at the CMTC that help to contribute to effective time management. The framework for this discussion is the Troop Leading Procedures, along with some basic principles developed over the course of several years of observation of numerous units that have trained at the CMTC. These principles are:

- Prioritize work
- Maintain a time line (reverse planning)
- Track the progress of essential tasks
- Delegate authority to subordinates/fix responsibility
- Develop the 2nd-tier leadership
- Adhere to the 1/3-2/3 rule
- Develop effective SOPs, and use them

Effective application of these principles contributes to the final, and most important, principle:

•Conduct a multitude of tasks, at all echelons, simultaneously.

Prioritize Work

Analysis of the mission renders an extensive list of tasks required for completion. List these tasks. Many of them will be tasks inherent to the duties of subordinates. Many of them may be unique to the specific mission. Prioritize the tasks. The priority assigned to these tasks should reflect their importance to the success of the mission. By prioritizing tasks, subordinates will have a better focused approach when preparing for the mission. There will seldom be occasions when a leader has sufficient time to accomplish all tasks to his satisfaction. Prioritizing tasks will help to ensure that those tasks of greatest importance will be accomplished.

Time Line

Develop a time line indicating when these tasks are to be initiated and completed. This time line should be a part of the warning order and the operations order. Ensure changes to the time line are posted and disseminated to subordinates.

Track Essential Tasks

Track the progress of essential tasks. Have a list posted to the Combat Trains Command Post (CTCP) reflecting the current time line and the progress of essential tasks. Establish a system for updating the status of essential tasks. By having this status posted and frequently updated, the CTCP will have a clear picture of the status

of preparation for the mission and will be better able to shift assets or priorities consistent with the task force commander's intent. The efforts will be better focused.

Often, there will be a requirement to track progress of activities within a task on the time line. For example, a unit may be given the mission to defend in sector. The S4 is charged with the responsibility of orchestrating the movement of all barrier material forward to various locations within the task force sector. The task on the time line reflects "transport barrier material." Within this task are the numerous details to be coordinated as to which trucks are assigned missions to haul what loads, and the configuration of each load. If the CTCP is tracking the progress of the work, the S4 will be able to change his guidance if his original time line cannot be met. The plan may require adjustment if there is an unanticipated shortage of concertina wire, or some of the trucks suffer mechanical problems, etc. Regardless, if the work is prioritized and tracked, the most critical work will be accomplished.

Delegate Authority

A common tendency of leaders at all levels is to attempt to do too many things personally. Delegate authority to subordinates and fix responsibility to ensure the task is accomplished to standard. This frees key leaders from doing one task so that they are able to supervise or check many others. The unit cannot afford for a key leader to become so engrossed with a single task that he loses perspective of his role in the accomplishment of the mission. A leader should never do

TIME MANAGEMENT — COMBAT TRAINS

<u>TRP LEADING PROCEDURES</u>	<u>TF CMD (TOC) ACTION</u>	<u>CSS ACTIONS (TRAINS)</u>
(1) RECEIVE THE MISSION	-SITUATION UPDATE (FM)	-CONTINUE BDA/CAS EVAC AND RECOVERY OPNS
(2) ISSUE WARNING ORDER	-WARNING ORDER #1	-WARNING ORDER #1
-WARNING ORDER #1	-MISSION STATEMENT -GENERAL INSTRUCTIONS -SPECIAL INSTRUCTIONS -TIME LINE	-CONTINUE SUPPORT ACTIVITIES -FINALIZE STATUS (PERS, MAINT, EQUIP, CAS EVAC) -FORECAST STATUS FOR UPCOMING MISSION -PREPARE ESTIMATES FOR UPCOMING MISSION
-WARNING ORDER #2	-ISSUE WARNING ORDER #2	-ISSUE WARNING ORDER #2
	-ANY CHANGES OR UPDATES TO MISSION STATEMENT, GENERAL AND SPECIAL INSTRUCTIONS -REVISED TIME LINE -STAFF OFFICERS REPORT TO TOC FOR PLANNING PROCESS	-STAFF GROUP MOVES TO TOC (S1, S4, BMO, MED PLT LDR) -MISSION ANALYSIS -RECEIVE CDR'S PLANNING GUIDANCE -CONSOLIDATE CBT TNS/UMCP ASSETS, HEALTH SERVICE (JUMP AID, AXP's), MAINTENANCE (MCP's) -SPECIAL REQUESTS TO HIGHER HQ
(3) MAKE A TENTATIVE PLAN	-DEVELOP ESTIMATES AND WARGAME -COURSE OF ACTION (COA) ANALYSIS -COA DECISION BRIEF -DETAILED WARGAME W/CDR -DECISION SUPPORT TEMPLATE DRAFTED	
-WARNING ORDER #3	-ISSUE WARNING ORDER #3	-ISSUE WARNING ORDER #3
		-FRAGO FROM S4 AT TOC SENDS GRIDS OF NEW LOCATIONS
(4) INITIATE MOVEMENT		-CBT TNS/UMCP PREPARE TO MOVE -DISPATCH QUARTERING PARTY TO NEW CBT TNS/UMCP LOC -RELOCATE CBT TNS/UMCP -REFIT, REFUEL, REARM -PCI
(5) RECON		-ROUTE AND SITE RECON OF NEW LOCATIONS
(6) COMPLETE THE PLAN	-ORDER PREPARATION -REPRODUCTION	-S1, MED OFF OR LNO RETURN TO NEW CBT TNS LOC W/GRAPHICS (BOUNDARIES, MSR's, BAS, AXP's, MCP's) -S1, BMO, MED OFF BRIEF KEY LEADERS, DISTRIBUTE CSS GRAPHICS AND MATRIX IF AVAILABLE -FORWARD SUPPORT ASSET COORDINATION (AXP's, MCP's, DECON TEAM)
(7) ISSUE THE ORDER	-BRIEF BACK -REHEARSAL	-DISPATCH FWD SPT ASSETS (MISSION DEPENDENT) -POSITION SPLIT AID STATIONS (MISSION DEPENDENT) -COORD LOGPAC (ATTEND: S4 NCOIC OR S1) -CONTINUE TO IMPROVE CBT TNS SECURITY
(8) SUPERVISE, REFINE THE PLAN		-S4 RETURNS TO CBT TNS, ISSUES ORDER -CONTINUE MANAGEMENT OF CLASSES OF SUPPLY -CONTINUE REPLACEMENT OPNS -EFFECT WEAPONS SYSTEM REPLACEMENT OPNS (WSRO) AS NEEDED -CONTINUE COORDINATION WITH SLICE ELEMENTS -CONTINUE SUSTAINMENT OPNS: -SLEEP PLAN -VEHICLE/WEAPON MAINT -PLL REQUISITIONS

Figure 1

anything that a less occupied subordinate could do.

2nd-Tier Leadership

Develop your second tier of leadership so it becomes intimately familiar with the responsibilities and requirements of the duty positions the next level up. In the CTCP, the senior S4 NCO needs to be able to respond to logistical requirements in the absence of the S4. He should be trained and able to accomplish those tasks of the S4. He should know that he has the authority and obligation to act on the behalf of the S4 in his absence. The same is true for the S1 and his personnel.

The large number of responsibilities required of the CTCP poses a special challenge to the leaders there. The austere work force creates the need to cross-train the assigned subordinates. Any individual answering a radio call should be trained and capable of properly processing and recording the data. A first sergeant should be able to pass logistical and personnel reports to a single individual. This cross training also pertains to the S1 and S4. Development of the second tier is applicable and necessary at every level.

The One Third-Two Thirds Rule

Allow appropriate planning and preparation time for subordinates. At a minimum, adhere to the 1/3-2/3 rule. Give subordinates more time, if possible.

SOP

Many units fail to have a functional Standard Operating Procedure (SOP) or fail to use their SOP effectively. The SOP is a reference that governs the routine functions of a unit. It helps to facilitate rapid assimilation of new individuals and cross-attached units. If a unit is habitually cross-attached, ensure it has a copy of the parent unit SOP. Once all parties have a copy of the SOP, it is important they under-

stand and use it. The more functions that you can codify and incorporate into your SOP, the less you have to direct in an operations order. Supplementing the task force SOP should be an internal SOP that governs, by duty position, the routine functions required to operate the CTCP. Obviously, enforcing the use of an effective SOP is far less time consuming than attempting to coordinate, direct, and supervise every aspect of every operation.

Time Management Matrix

The matrix at Figure 1, using the Troop Leading Procedures as a framework, shows a simplified example of the activities that occur in the task force TOC, and what should occur in the CTCP and the combat trains. The intent is to maximize the time management principles discussed previously, most importantly: conduct a multitude of tasks, at all echelons, simultaneously.

Effective Time Management: A Scenario

The task force has been involved in continuous operations for several days. The brigade has just issued a warning order. The task force receives a change of mission and will transition from the attack and prepare to defend from the positions it now occupies. The TOC issues Warning Order #1.

Upon receipt of the task force warning order, the S4 prepares and issues a warning order to his subordinates. This warning order includes the mission statement, general and special instructions, and a time line.

Within 30 minutes of receipt of the brigade warning order, the combat trains staff collects the combat status from the forward companies, separate platoons, and field trains CP, collates and provides this information (FM) to the commander and staff at the TOC. Included in this situation update are all CSS limitations (internal and exter-

nal) that impact on mission execution. Internal limitations may include a shortage of ambulances in the medical platoon due to maintenance problems, while external limitations may include a reduced backhaul capability from the supporting medical company due to enemy activity. Execution of CSS activities for the present mission is placed in the hands of the capable second tier, that is, the S4 section's NCOIC, the medical platoon sergeant, and the senior mechanic in the UMCP. Casualty evacuation and recovery operations continue and the emergency Class V requested by a forward company is promptly dispatched. The unit CSS reports continue to be sent to the CTCP, are collated, recorded, and processed. The focus of the primary CSS leaders becomes planning for the next mission.

The TOC issues Warning Order #2. Per SOP, the S4 issues Warning Order #2 to his subordinates and provides specific instructions to his NCOIC. He verifies that the support platoon leader in the field trains has been notified of any changes in the task organization that might affect the configuration of the LOGPAC. He also checks to see that the field trains is activating the appropriate annex of the SOP that tailors packages of Class V for the purpose of prestock in the defense. With an updated unit status and estimates, the S4, S1, BMO, and medical platoon leader report to the TOC for the planning process.

While the primary CSS planners are absent from the combat trains, there is no break in the activities conducted at the CTCP. Casualty evacuation and vehicle recovery continue. Reports continue to be processed and the unit status continues to be refined and verified.

The CSS planners are at the TOC for the development of the task force plan. They continue to advise the commander and other staff members of any CSS limitations to the courses of action being wargamed. The commander selects a course of action. The CSS plan to support that course of action is finalized. The S4 confirms the

site selection for the combat trains primary and subsequent positions and selects the main supply route (MSR) and three alternate supply routes (ASRs). Several potential decontamination sites are identified. Based upon a METT-T analysis, the medical platoon leader determines that the most efficient casualty evacuation technique will be using a split aid station configuration, with the treatment teams positioned well forward and additional ambulances attached to the company designated as the main effort. A treatment team is designated as the on call "dirty aid station" and will be prepared to move to the decontamination site if a persistent chemical agent affects elements in the task force sector. If necessary, an ASR will be designated as the "dirty supply route." The BMO expands the maintenance time lines, permitting more vehicles to be "fixed forward." For example, those organizational or DS jobs requiring up to six hours to repair will be repaired in the company trains, and those requiring 6-24 hours will be recovered to the UMCP. These times are based upon the task force mission. The S1 verifies the commander's guidance for priority of personnel replacement if it differs from the SOP. The plan is complete.

The TOC issues Warning Order #3. The S1 calls the CTCP with Warning Order #3 and instructs the S4 NCOIC to dispatch the quartering party to the new combat trains location. Per SOP, the S4 NCOIC directs the consolidation of all combat trains and UMCP assets and orders them to prepare to move. They continue to refit, refuel, resupply, and conduct PCIs preparing for the next mission. Prior to departing the TOC, the S1, BMO and medical platoon leader secure copies of the CSS graphics and execution matrix. The S1 returns to the CTCP. The medical platoon leader and BMO return to the aid station and UMCP respectively, and brief their subordinates on the plan for the next mission. All assets prepare to move to the new location as the quartering party completes their quartering mission. The

S4 remains at the TOC providing CSS expertise and supervising the reproduction of the CSS graphics and matrix. He briefs the CSS plan at the Task Force Operations Order.

The CSS assets are moved to their new position. As the CSS plan called for a split aid configuration of the Battalion Aid Station, these assets are emplaced accordingly, positioned well forward to reduce casualty evacuation time. Recovery assets and ambulances are placed forward in the selected positions to facilitate prompt evacuation of wounded soldiers and recovery of NMC vehicles. Early emplacement also facilitates daylight route reconnaissance of the medical and maintenance teams from the company positions to the UMCP and to the forward treatment teams.

Upon completion of the Task Force Operations Order, the S4 returns from the TOC to the new CTCP location. He briefs the combat trains personnel on any changes and ensures they understand the plan. Graphics and matrices are disseminated. He assigns tasks and ensures all personnel understand the priorities of work and the time line. Per SOP, the time line and the progress of the key events are tracked in the CTCP. The S4 posts all graphics to the CP map. Appreciating the importance of the CTCP's mission to perform the functions of the task force TOC if the TOC is destroyed, he verifies that he has all graphics and a complete copy of the TF and brigade OPORDs. He conducts a communications check with the brigade tactical and main CPs, and the DS FA battalion.

Per SOP, the S1 meets at the LRP with all first sergeants and specialty platoon sergeants 30 minutes prior to the arrival of the LOGPAC. A rehearsal of the CSS plan is conducted to ensure that all CSS executors understand the plan and possess the associated graphics and matrix. Routine CSS coordination is performed.

The CSS philosophy of this unit emphasizes planning. It recognizes that planning in the CSS arena is an investment that always pays huge divi-

dends when done well. The more thoughtful and detailed the plan, the greater the efficiency in execution. As such, all key CSS planners are present for the development of the task force order. The second-tier leaders have been well trained and are capable of exercising their good judgment and great initiative when they understand the plan and the commander's intent. The CSS executors understand the principles of effective time management. Through the use of an effective SOP, prioritization of work, and valid time line, they are able to effectively and efficiently conduct a multitude of tasks, at all echelons, simultaneously. The end product is superb combat service support enjoyed consistently by the task force.

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Morgan's 1862 Christmas Raid

by Major James D. Brewer

Brigadier General John Hunt Morgan had been married only eight days when he left his beautiful new bride and led a column of Confederate Cavalry out of Alexandria, Tennessee, on the damp morning of December 22, 1862. During what would become known as the Christmas Raid, Morgan would alter the lives of many Kentuckians that fate had parceled along the path, and he would make sure thousands of Federal soldiers received their first taste of combat at the hands of his Southern horse soldiers.

General Morgan's mission was to drive his cavalry into central Kentucky and interdict the Union supply line along the Louisville & Nashville Railroad. He was to slow the Federals' push into the Deep South by wreaking havoc in their rear and crippling their supply line. And as in any classic cavalry operation, Morgan was not to become decisively engaged.

The character and disposition of Morgan's men made them particularly well-suited for the independent operations called for by a raid deep behind enemy lines. Always more at home on their own than under the restrictions of a tightly controlled maneuver plan, Morgan's troopers were a headstrong, independent breed of Western men, who often chafed under the saddle of strict military discipline. Still, their skill in a fight and their tenacity had been plainly demonstrated at Shiloh and in middle Tennessee, and few units could match their daring and initiative when given the freedom to roam in the Federals' backyard.

On December 20th and 21st, Morgan's men had readied themselves for what they knew would be a long, difficult march. With mobility and firepower their chief concerns, they pared down the usual cavalryman's

load and planned to move fast and strike hard. Most of them carried short-barreled Enfield rifles, but some had managed to procure carbines. Still others held on to the double-barreled shotguns they had joined the army with, perhaps supplementing them with one or two Colt Army revolvers. Along with Nathan Bedford Forrest, General Morgan was one of the first cavalymen to urge his men to leave the sabre — with its added weight and limited role — behind on such a raid. As they departed Tennessee, at least 400 of the raiders were still unarmed — stuck pulling horse-holding duty until weapons could be captured.

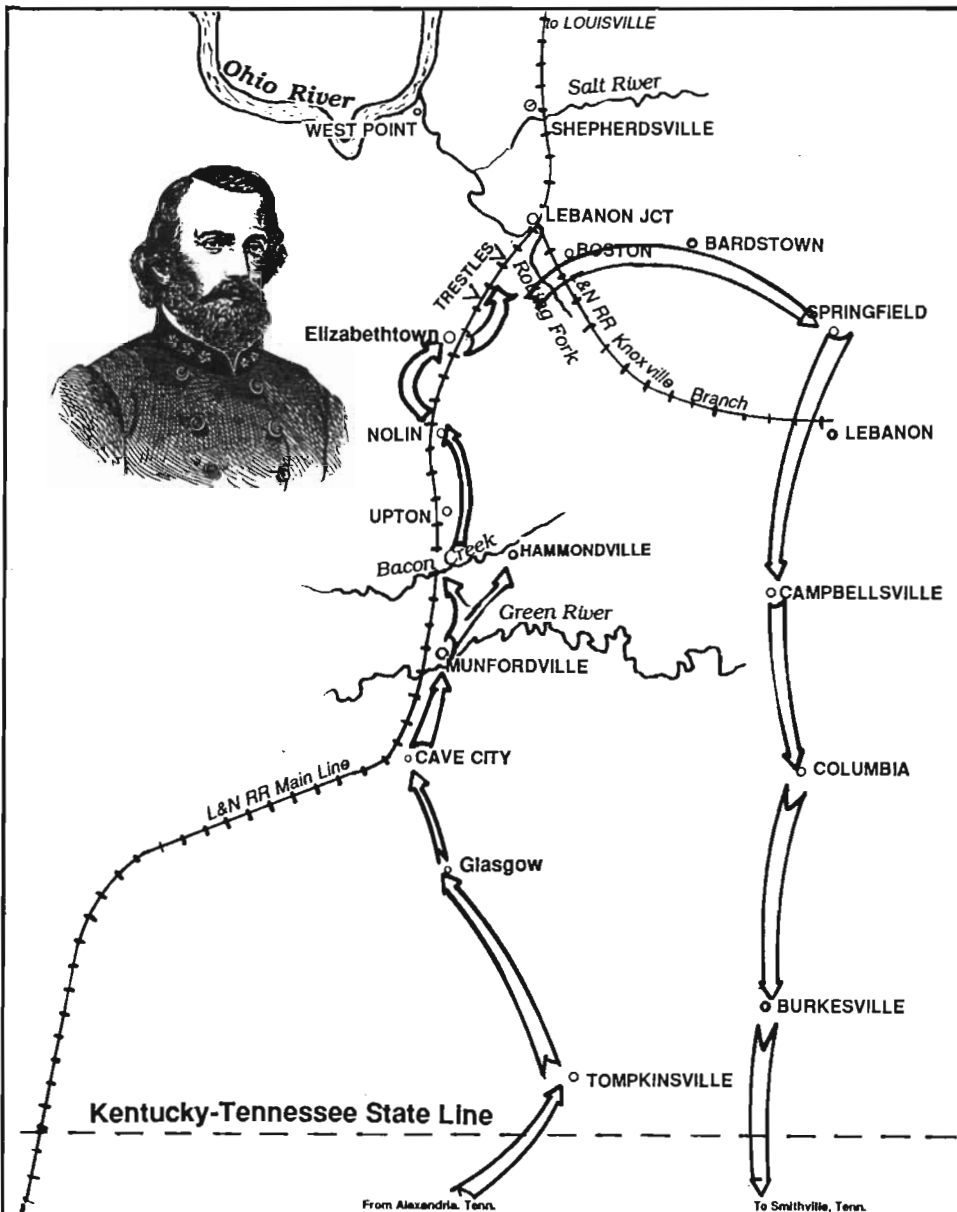
The troopers that chose to ride with Morgan were a young group, most of them between 18 and 35 years old, yet because of their Western lifestyle and experience in the saddle, they knew full well what hard riding and rapid execution lay ahead (Map 1). Each trooper carried three days' cooked rations, two extra horseshoes, 12 nails, one blanket, and an oilcloth or overcoat. So they would not be slowed, Morgan chose to take no ammunition wagon, opting for each soldier to carry 40 rounds. Other than the artillery, nothing traveled on wheels. And at daylight on the 22nd of December, 1862, some 4,000 men and seven pieces of artillery, organized into two brigades under the command of Colonels Basil Duke and John Breckinridge, rode out of Alexandria, Tennessee, on a strike at the soft underbelly of the Federal supply line.

Moving via Centreville to Glasgow, Kentucky, over the next three days, they covered approximately 90 miles at a pace that would scarcely be slackened throughout the raid. As they reached Glasgow on Christmas Eve, the advance guard ran into two com-

panies of the 2nd Michigan Cavalry. Following a brief skirmish, the Federals retired toward Munfordville, losing two killed, two wounded, and 20 captured. Morgan had four wounded in the encounter, two of whom later died. With this fight, Morgan lost the element of surprise, and the telegraph wires all along the Louisville & Nashville Railroad began humming with news of his approach. Morgan gained little from the skirmish, unless you count the Christmas turkeys he "liberated" from the captured Federals, but he paid dearly for them in that the Federals, now alerted, began to congeal the forces necessary to stop him.

On Christmas Day, the rebel raiders pressed northward, encountering only slight enemy resistance south of Green River. Since no large Federal forces were as yet in a position to threaten them, Morgan's command rested in a secure camp in the woods that Christmas night, somewhere between Upton Station and Hammondsville, still hugging the L & N Railroad. With the windfall of turkeys, courtesy of the captured sutler outfit, the men enjoyed a satisfying Christmas dinner, and they took the time to unsaddle, curry, and rest their mounts for the night. With the mad dash yet to come, they would soon be grateful for this opportunity.

For the next two days, Morgan would shadow the L & N Railroad line northward to his major objective — the two expansive, wooden trestles, each 80 feet high and 500 feet long, that spanned the valleys northeast of Elizabethtown along Muldraugh's Hill. Enroute, he reduced various small garrisons that he feared might threaten his escape, and by dividing his force into smaller parties, he kept the Federals guessing as to his in-



the enemy's pickets, and immediately on my arrival at Hammondsville, I dispatched two companies of Colonel Duke's command with similar instructions, in the direction of Munfordville. My object was to induce the enemy to believe that I intended to attack the fortifications at Green River, and, by so threatening him, to divert his attention from the combined attack which I intended to make the succeeding day on the stockade at Bacon Creek and Nolin" (O.R. XXXII, 155).

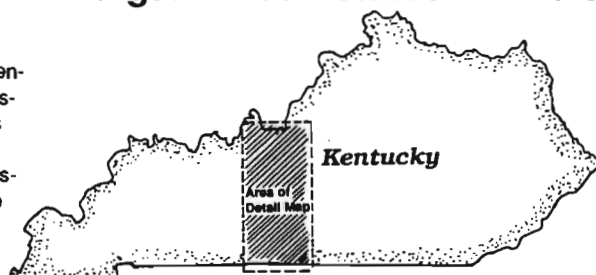
Early on the 26th, two regiments of Morgan's cavalry seized the Federal stockade at Bacon Creek, while the main body pressed northward to Upton. There they severed the telegraph line to the south, and proceeded to mount one of the first effective electronic warfare campaigns, i.e., imitative communications deception. Accompanying the raiders on their soiree was a strange, young telegrapher of dubious background named George "Lightning" Ellsworth. Having learned his craft at the hand of Samuel Morse himself, Ellsworth had the unique ability to imitate the Morse Code signature (the characteristic pattern or rhythmic timing of dots and dashes, also known as the "fist") of a given telegrapher, thus allowing Morgan to deceive the enemy as to his intentions. Ellsworth would listen to the telegraph traffic for a few moments, memorize the signature of a given operator, then send messages as far north as the lines would carry them. John Wyeth, a respected physician and biographer of Nathan Bedford Forrest after the war, was a member of Quirk's Scouts on this expedition. He describes Ellsworth's technique.

"After the wire was tapped, I sat within a few feet of General Morgan

Map 1

Morgan's 1862 Christmas Raid

Morgan's Raid disrupted Union supply routes through Central Kentucky that depended on the Louisville & Nashville Railroad. In less than two weeks, he crippled the railroad from Upton to Shepherdsville, doing damage it would take several months to repair

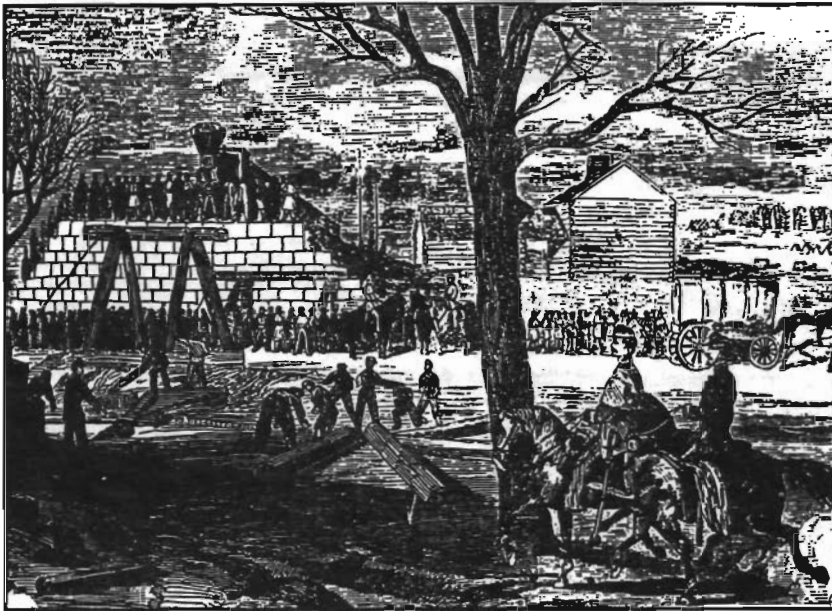


tended target. His official report describes his intent:

"...reached Hammondsville with my command at midnight. I had ordered

Colonel Breckinridge, as he passed the cross-road leading to Woodsonville, to send two companies in that direction, with instructions to drive in

The L&N - Union Lifeline in the West



The L&N Railroad was an engineering marvel of its day, completed just two years before the outbreak of a war that would introduce the strategic importance of railroads in military operations. The greatest topographical challenge along the 187-mile route was the steep ascent up Muldraugh Hill. Ill-named, it is actually a serpentine ridge that begins near West Point, Ky. and winds 55 miles southeast to Campbellsville. Two great wooden trestles carried the line up the ridge to a 2,000-foot tunnel cutting through the crest north of Elizabethtown.

Morgan's destruction caused an immediate emergency for Federal officials, who put urgent requests in Northern newspapers for skilled carpenters and engineers and rushed them to the scene. Reportedly, the line was out of service for only three months and, in any case, alternate railroad and river routes kept Union armies in Tennessee well supplied. The contemporary magazine engraving above shows Federal crews working on the L&N's Bacon Creek bridge, farther south, after Morgan's raid.

and heard him dictate [to Ellsworth] messages to General Boyle [commander of Federal forces in central Kentucky] in Louisville, and other Federal commanders, making inquiries as to the disposition of the Federal forces, and telling some tall stories in regard to the large size of his own command and its movements" (Wyeth 27).

It was 3:00 p.m. when Basil Duke's regiment closed on Nolin, Kentucky, and the remaining forces, plus a section of artillery, remained with Morgan at Bacon Creek. The stockade there yielded 93 prisoners from the

91st Illinois Infantry, and the bridge and stockade soon went up in flames. At Nolin, Colonel Duke took 76 more prisoners from the same Federal unit and dispersed their captured weapons among the unarmed men in his command. Once the entire force united at Nolin, Morgan ordered large fires to twist the rails of the L & N into a useless heap of iron. And as word of Morgan's approach — both fact and Ellsworth's special brand of electronic fiction — spread northward, Union officers in Louisville struggled to raise a force large enough to stop him. When Brigadier General M.D. Man-

son, commander of Federal troops at Bowling Green said, "I cannot say with certainty where the rebels are... the opinion is they have gone north" (O.R. LXIV, 57), he spoke for most of the Union commanders within a 200-mile radius of Morgan's path.

While the Confederate raiders had been enjoying their Christmas dinner that night outside of Upton Station, Colonel John Marshall Harlan was receiving orders to march his infantry brigade from Gallatin, Tennessee, to "drive from the Louisville and Nashville Railroad the rebel cavalry of Morgan." Recognizing the uselessness of chasing cavalry with infantry, Harlan gathered railroad cars from as far away as Nashville to set his six infantry regiments, one cavalry regiment, and one artillery battery on Morgan's heels. To act in concert with Harlan, Brigadier General J. J. Reynolds moved the 12th Division toward Scottsville and Glasgow in the event Morgan was repulsed and forced to turn back. Neither Reynolds nor Harlan was certain of the size or intention of the Confederate cavalry force that was racing through central Kentucky, though they probably suspected the trestles were on his Christmas list. Not only did incomplete intelligence hamper Colonel Harlan, but he was also plagued by delays along the rail line caused by everything from engine breakdowns, to bad stretches of track, to hesitant civilian conductors who wanted no part of chasing the Confederate cavalry. An angry, frustrated Harlan spared no blame in his report.

"It may be proper also to state that the track of the railroad was, when I left Gallatin, in bad condition, from recent rain, though that difficulty might have been obviated had more engines been furnished. This unfortunate detention delayed the rear train, so that it did not reach Bowling Green until 10 o'clock on the night of the 26th. For that detention I am not in any wise responsible as those concerned received from me full information as to the number of men, horses,

and guns for which transportation would be required. After my arrival at Bowling Green, I learned that all of Morgan's forces was most probably north of Munfordville, beyond the points to which I had been ordered, and it was evident that I must follow him beyond that place, in order to save any part of the railroad from destruction" (O.R. XXXII, 137).

What smacks of sniveling on the colonel's part, must, in all fairness, be viewed as a major logistical and transportation nightmare. Forced to pursue a highly-mobile, independent enemy force with either late or wrong intelligence, using a railroad line that was being destroyed in front of him, was a near-hopeless task. Still, Harlan resupplied at Bowling Green and continued his pursuit; but again, the engines broke down and kept him from reaching Munfordville until December 27th. Having been cramped into railroad cars for 48 hours, Harlan allowed his men a brief rest at Munfordville, and he communicated to his superiors that he feared Morgan would attempt an attack on Elizabethtown, and possibly even attempt to destroy the trestlework at Muldraugh's Hill. Faced with what must have now seemed a futile chase, Colonel Harlan reassessed his priorities. From here he would (a) attempt to save the trestles, and if unsuccessful, he would (b) save the bridge over the Salt River at Shepherdsville, south of Louisville.

While Harlan was wrestling the railroad and running out of time, the Confederates were grappling with the Federal garrison at Elizabethtown, just as Harlan had predicted. On the 27th of December, Morgan's men sat within one mile of Elizabethtown and demanded the surrender of the town. His approach hadn't exactly surprised the Union troops in Elizabethtown; in fact, they had moved into town eight companies of the 91st Illinois Infantry from their original position guarding the trestlework on the L & N. Building hasty barricades at the railroad station and loopholing the brick build-



A Stockade Site

Today, this is all that remains of Union trenches, flanked by a stone wall parapet, on the crest of a hill overlooking the L&N tracks, looking south. The entrenchments, and a stockade that once stood about 50 feet to the right, were built to protect the trestle at Broad Run. Tracks are visible at left, leading to trestle beyond brush and evergreens, center background.

ings in town, the Federals were prepared to fight house-to-house and into the streets if necessary. Lieutenant Colonel H.S. Smith, commander of the forces at Elizabethtown, had apparently underestimated the size of Morgan's force (a rare occurrence during such a running fight), so as soon as the skirmishers engaged Morgan outside the city, Smith sent the Confederate commander a rather curt demand for his surrender.

*Elizabethtown, Ky.
Dec 27, 1862*

To the Commander'of the Confederate Forces:

SIR:

I demand an unconditional surrender of all your forces. I have you surrounded and will compel you to surrender. I am, sir, your obedient servant,

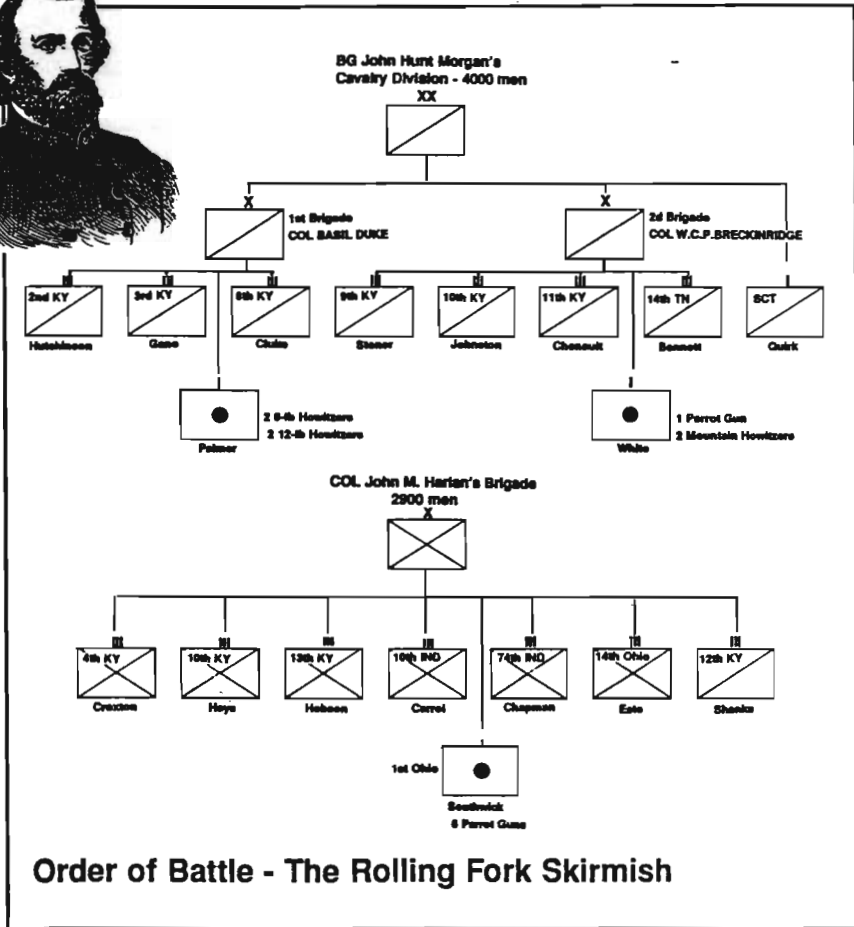
*H.S. Smith
Commanding U.S. Forces*

Whether this was a bluff, a wild gamble, or simply a function of imprecise intelligence, it must have brought quite a chuckle to General Morgan. Colonel Basil Duke, Morgan's second in command, called

it "the most sublimely audacious [communication] I ever knew to emanate from a Federal officer" (Duke, 332). Morgan quickly informed the Federal commander that he had the situation backwards, and that it was Smith and the town who ought to surrender. Smith replied that it was not the duty of a United States officer to surrender, and thus began a brief but spirited struggle for Elizabethtown.

With his guns positioned on the cemetery hill just south of town, Morgan sent Duke to the right and Breckinridge to the left, and launched his attack at 1:30 p.m. His artillery pounded the city, and sent the Federals recoiling on the center of town, where they occupied the two-story buildings surrounding the town square. The pro-Union account in the *Louisville Journal*, dated December 31 1862, states:

"His [Morgan's] firing commenced without any warning to the non-combatants, including women and children, to leave. Some of Morgan's friends contend that he did send warning for women and children to leave in 45 minutes; but if there was such a respite offered, it is certain that no man, woman, or child heard of it; and none could leave, for some attempted to leave town on the west



and north side, but were fired on, and driven back by Morgan's men. And before half the time pretended to be given had elapsed, the artillery was banging away and fired 107 shots of shell and ball into the town, which lay at his mercy — almost under his feet — and, the only wonder is, that the town was not battered down."

One of those Confederate artillery rounds smashed into the room where Lieutenant Colonel Smith was posted, killing a soldier and slamming into the woodwork hard enough to send a splinter into the colonel's face. But apparently the Confederate soldiers investing the town didn't sense the fear and urgency reflected in the above account, for as one soldier states, he found the food good and the hospitality quite cordial, even during the bombardment. A private in Breckinridge's 9th Kentucky, Robert L. Thompson, describes forming in line of battle below the present ceme-

tery hill south of Elizabethtown, advancing on foot across a waist-deep, flooded creek, and hugging the buildings for cover as he advanced through the streets.

Capturing three Federals by himself, he sent them to the rear and went into the hotel they had emerged from, only to find their breakfast on the table. Joined by other Confederates, the group "ate breakfast, and during the whole time we were eating, the little battery on the hill was being worked to its full capacity. When we had finished our breakfast and went out on the street again, we saw white handkerchiefs tied to ramrods hanging out the courthouse windows" (Thompson 571).

The white flags that Thompson saw reflected the surrender initiated by a Captain Fouchey and his men. They took a vote on whether or not to fight it out, and afterward determined to show forth the white flag. When the other defenders of E-Town saw those

flags, they assumed Lieutenant Colonel Smith had ordered a general capitulation, so the rest of the Federal garrison followed suit. Smith was irate upon learning of the unauthorized surrender; but once initiated, he had little option but to see it through. What he called a "betrayal" by a junior officer probably saved several hundred lives.

In Elizabethtown, Morgan's men captured 652 prisoners, burned the stockade, the depot, and over 3,000 bushels of wheat. When the raiders DXed their worn-out horses, both Unionist and Southern Rights men found themselves on the losing end of the exchange, and many a southern cavalryman got new boots and overcoats, courtesy of the Federal prisoners. According to the *Louisville Journal*,

"Morgan himself went into the store of B. Stadaker & Co., and in a very polite way said he wanted goods and would pay for them in good money; made free to open drawers and boxes and helped himself, all in a very polite way, except now and then charging the merchant with lying, and wound up with a bill upwards of \$1,200 in silks and costly merchandise, had them boxed up, and launched down the pay in confederate trash, not worth, as Stadaker says, a continental cent. Others came in, took three or four hundred dollars worth more of goods, and did not pay a cent."

After a hot meal that night, the command moved northeast the next morning to accomplish the ultimate mission of the raid. Colonel Breckinridge attacked the Federal fort covering the lower trestle of the L & N over Sulphur Branch Creek, and Colonel Duke struck the fort guarding the upper trestle over Broad Run. Unfortunately for the Federals, these modest forts, designed to overwatch the two critical railroad trestles, were incomplete and poorly armed. What was designed by Brigadier General C.C. Gilbert, commander of the troops along the L & N, to be artillery platforms with protection for infantry, had far too little

infantry and no artillery at all. Gilbert was gambling that the small garrisons of infantry, divided between the two forts and Elizabethtown, could somehow delay Morgan until Colonel Harlan's pursuing infantry could overtake him. The forts held only about 700 infantry, composed of the 78th Illinois, the 71st Indiana and remnants of the 91st Illinois hastily removed to defend Elizabethtown. Under command of Lieutenant Colonel Matson, they prepared to withstand a siege, but such a time-consuming effort was not in Morgan's plan; and in his official report Morgan proudly declares,

"After two or three hours shelling, both places surrendered, and at 7 o'clock that evening, I had the satisfaction of knowing that the object of the expedition was attained, and the railroad was rendered impassable for a least two months. These two trestles are the largest and finest on the whole road, being, each of them, some 60 feet in height and from 300 to 350 yards in length. Neither of them had ever before been destroyed during the war. Seven hundred prisoners, including 27 officers, were captured, and a large and valuable amount of medical, quartermaster's and commissary stores were destroyed" (O.R. XXXII, 156).

Had Elizabethtown and the trestle forts been able to hold out a few hours more, Morgan might have been caught by Harlan's approaching infantry, and the trestlework saved; for Harlan reached Elizabethtown on the 29th, the morning after Morgan had destroyed the trestles. Eating the enemy's dust and having to listen to irate Unionist citizens hammer him for failing to protect the countryside was taking its toll on the Federal commander, and Harlan was extremely frustrated at continually showing up just a little too late. So, when Colonel Harlan learned that Morgan's command had moved toward Bardstown last night and camped not ten miles away, he was ecstatic. If he moved immediately, he might yet get a

chance at the raiders; and though his men were tired and stiff from the long, cramped train ride, he sent them marching east along the Bardstown road.

At their camp on the Rolling Fork River that morning, the Confederates were attending to unfinished business. While the majority of the command was across the river by 9:00 a.m. and enroute to Bardstown, Morgan, his regimental commanders, and about 300 men remained on the west side. As he had done at Bacon Creek, Morgan divided his force to wreak havoc with the nearby Federal garrisons, sending R.S. Cluke's 8th Kentucky, with one piece of artillery, to attack and burn the bridge over the Rolling Fork near Lebanon Junction. Once this was accomplished, they were to cross the river (the ford being held by a rear guard) and continue to Bardstown. Colonel D. W. Chenault's 11th Kentucky was sent across the river with one piece of artillery to burn the Federal stockade and trestle at Boston. Three companies of Breckinridge's 9th Kentucky were dispatched southeast with a mountain howitzer to defeat the garrison at New Haven.

Because the Rolling Fork was swollen with winter rains, it had taken Morgan longer for his main body to cross that he anticipated. There now remained some 300 men, including pickets and a few detachments, to hold the ford until Cluke's regiment returned from Lebanon Junction.

Also remaining on the west side of the river was an elite group of Morgan's officers, busily involved with the court-martial hearing of a Lieutenant Colonel Huffman, accused of violating surrender terms with the prisoners at the Bacon Creek Stockade. Basil Duke gives this account of what happened that morning.

"Both brigade commanders, and three regimental commanders, Cluke, Hutchinson, and Stoner, were officers or members of this court. Just after the court had finally adjourned, ac-

quitting Colonel Huffman, and we were leaving a brick house, on the southern side of the river and about six hundred yards from its bank, where our last session had been held, the bursting of a shell a mile or two in the rear caught our ears. A few vedettes had been left there until everything should have gotten fairly across. Some of them were captured; others brought the information that the enemy was approaching. This was about 11 a.m." (Duke 336).

Finally, Colonel Harlan had caught them and, had he known how close he came to capturing Morgan's top field commanders, perhaps he might have pressed toward the river more quickly. But Duke and the others raced for the crossing site and took command of the rear guard. As he formed the men into line of battle, Duke was worried about two matters:

- How much cavalry did Harlan have? If his men made a rush to cross the river, would they be pursued and struck down, possibly even drawing the main body into a protracted fight?
- What would happen to Cluke's regiment at Lebanon Junction? Cut off from the main body and unable to cross the river, they would likely be captured.

Duke wrongly believed at the time that Harlan had "nearly 5,000 infantry, 2,000 cavalry and several pieces of artillery" (Duke 337) — a far cry from Harlan's actual strength of 2,900 men. But, based upon his estimate, Duke sent a courier to tell General Morgan he would hold the ford as long as possible.

With his artillery, Colonel Harlan opened up on the ford to prevent further crossings, and he sent his regiment of cavalry under Colonel Shanks forward to fix the enemy and determine their strength. He ordered his infantry forward at the double-quick to form two battle lines.

"I went to the front in person, and from a high hill, I saw quite distinctly a very large body of cavalry formed

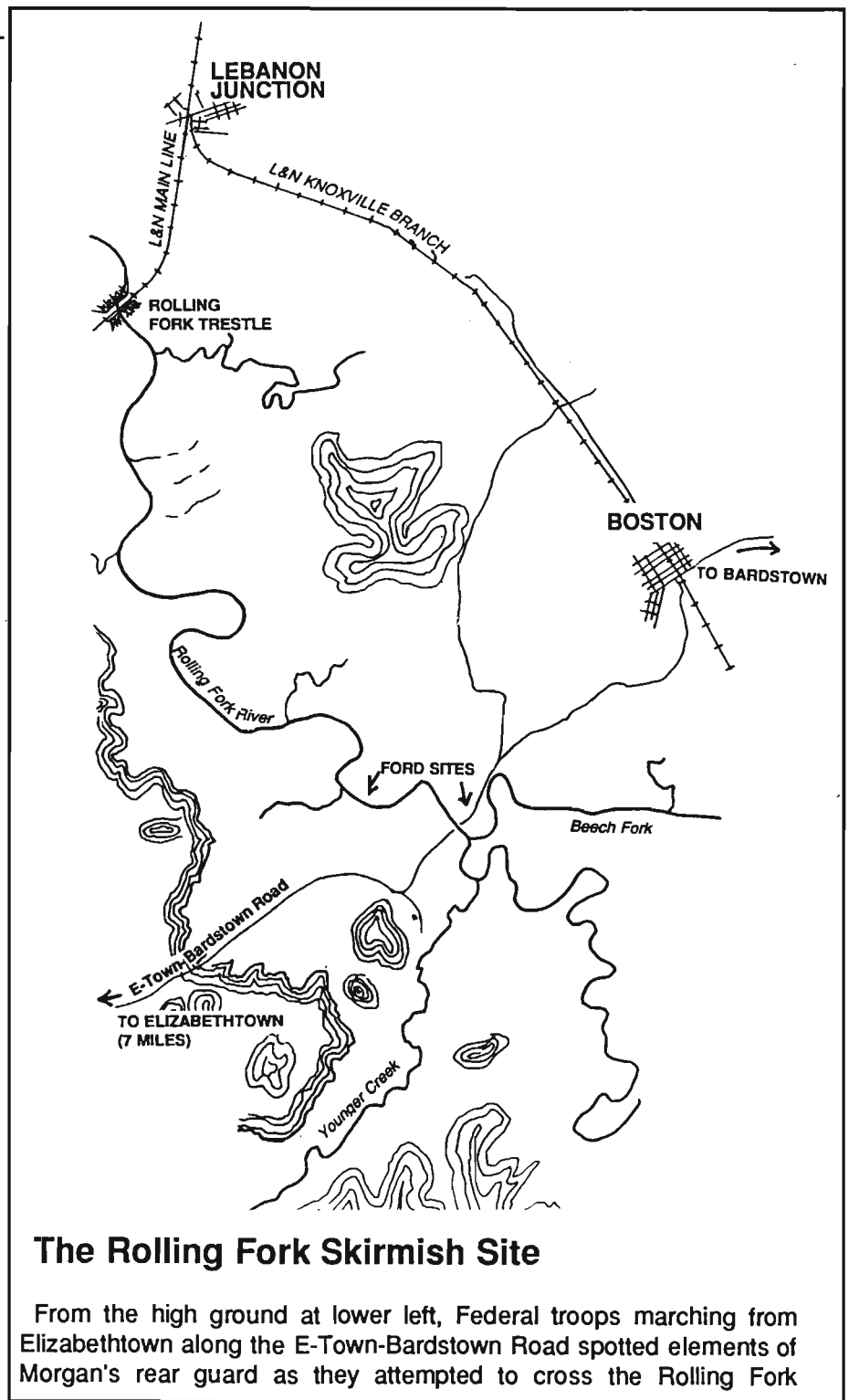
in line of battle near the river. Their officers were riding along their line, apparently preparing to give us battle. Knowing that Morgan had a larger force than I had, I proceeded cautiously, and yet as expeditiously as the nature of the ground and the circumstances admitted" (O.R. XXXII 139).

This "cautious" approach by Harlan's forces bought the Confederates valuable time. For even though Harlan had 2,900 men and artillery in line of battle by noon, opposing no more than 300 men whose backs were quite literally against the river, he did not attack. Skirmishers advanced slowly, the battle lines crept forward, only to hesitate as the Confederates opened fire. Amazed, yet delighted by Harlan's hesitancy, Duke had expected at any moment to be "swept... into the turbid river at our backs" (Duke 337).

"Fortunate as this was for us — indeed, it was all that saved us — the suspense yet became so sickening, as their long line tediously crept upon us and all around us, that I would almost have preferred after an hour of it had elapsed, that Harlan had made a fierce attack" (Duke 337).

Part of Harlan's delay must be attributed to the Confederates' successful deception effort. As the Federals began slowly pushing the enemy skirmishers back, they came upon a defensive line stretched across a meadow about 300 yards wide. A slight depression across the meadow, and roughly parallel to the river, formed a natural breastwork, and the flanks of the Confederate position were anchored by thick woods and rugged washouts. From here the Confederates judiciously moved their few defenders so as to be barely visible to the Federals, popping up from various points along the line, thus creating the impression of greater numbers.

The Union Parrot guns peppered the crossing with shrapnel and stalled the retreat across the Rolling Fork. Mean-



The Rolling Fork Skirmish Site

From the high ground at lower left, Federal troops marching from Elizabethtown along the E-Town-Bardstown Road spotted elements of Morgan's rear guard as they attempted to cross the Rolling Fork

while, Major Bullock, at the head of Cluke's regiment, came riding hard from the northeast, and managed to rush his men and their six-pounder gun into the safety of the tenuous Confederate line. Although Basil Duke considered trying to answer the

Federal artillery with the newly arrived howitzer, he realized that the six-pounder had no chance of responding in kind to the enemy's fire, and he feared the action might "warm the affair up into a hot fight" (Duke 338). As a cavalry leader, Duke had,

in effect, declined decisive engagement, an inherent task of the raid.

Five fresh companies from Cluke's regiment joined the line, raising the Confederate strength to almost 800. Quirk's Scouts had located another ford nearby, and by digging down the sides of the bank, the six-pounder gun was gotten across the river just before the Federal shelling completely obscured further passage. When Colonel Duke received word by courier from General Morgan to withdraw, he would have been glad to follow the order; however, the Union artillery was well-served and accurate, and the remnant of Morgan's command was trapped.

"...when the enemy moved upon us again, his infantry deployed in a long line, strongly supported, with a skirmish line in front, all coming on with bayonets glistening, the guns redoubling their fire, and the cavalry column on the right flank (of their line) apparently ready to pounce on us too, and then the river surging at our backs, my blood, I confess, ran cold" (Duke 338).

Just when it appeared the Confederates would be overrun, they raised the Rebel Yell in defiance all along the line. The eerie, shrill, howl floated through the meadow and echoed from the wooded hollow behind the Union advance as Duke's men opened fire. Suddenly, and inexplicably to Colonel Duke and his men, the almost 3,000 Federals checked their assault, and the Union troops began to withdraw. What had looked like an overwhelming Federal attack certain to drive the enemy into the raging river, had simply melted away.

Colonel John Harlan, still uncertain of the enemy's strength, and perhaps unnerved by Cluke's daring reinforcement, hesitated to press his attack. Halting his infantry, he continued the artillery barrage over what was now two crossing sites and waited for the situation to develop. The situation developed, all right, for Duke took advantage of the lull to seize the initiative from Harlan. Quirk's Scouts had

discovered yet a third ford, offering a route of escape uncovered by the Union guns. So ordering Captain Pendleton, with three companies, to attack the Federal artillery position on a hill at the right of the Federal line, Duke also sent a force in a feigned attack against the center of the enemy force. His actions not only occupied the entire Federal line, but by making the artillery defend themselves, effectively distracted their guns while the remaining Confederate troops could mount up and dash across the river. Harlan, in his report, gave this view of the action.

"...after a while... they then made some demonstrations to occupy an eminence upon my right. To meet this the Tenth Indiana (Colonel Carroll) was ordered to occupy that eminence, from which four companies were ordered to clear the woods on the right of my line. ...a section of the battery was ordered to occupy the eminence, and the Tenth Kentucky, Lieutenant Colonel Hays, ordered to support it... The firing now became general all along the right of our line of skirmishers; but the rebels, after an obstinate resistance, broke and fled precipitately in every direction. Some struck out into the woods; some went up the river as far as New Haven; some swam the river with their horses" (O.R. XXXII, 139).

What doesn't seem quite right about this account is that, if the Confederates were as disheveled as Harlan described, why were not some of them captured? Harlan had Shank's cavalry regiment in good position to round up any stragglers. Not only were none captured, but Duke's rear guard slipped from Harlan's grasp with only three men wounded: Captain Pendleton, Colonel Duke (hit by shrapnel while preparing to cross the river), and one private. The Federals lost three killed and one wounded; but they lost something probably more important: a solid chance to disrupt Morgan's raid by tying up his command in a decisive fight. Had Harlan

been able to force Morgan to return and extract the rear of his command from a decisive engagement, he would have bought valuable time for other Federal commanders to put together a force large enough to challenge Morgan later in the course of the raid.

Morgan had escaped and Harlan knew it, so he camped that night near the battlefield, taking some satisfaction in knowing that his attack had diverted Cluke's regiment from its mission of destroying the Rolling Fork Bridge at Lebanon Junction. The following day, Harlan would proceed north with his command to defend Shepherdsville, the suspected next target for Morgan's men.

On the evening of the 29th, Morgan's entire command reached Bardstown, including Chenault, who had destroyed the Federal stockade at Boston. On the 30th, Morgan moved to Springfield, where he was joined by the force sent by way of New Haven. That attack had failed to overcome the Federal garrison. In Springfield, Morgan learned that a trap was being prepared near Lebanon, as approximately 2,000 men from Danville, Burkesville, Campbellsville, and Columbia, under command of Colonel William A. Hoskins, were gathering to stop him. Since neither force was certain of the size of the other, both opted for caution. Although there were more than 8,000 Federal troops in striking distance of Morgan, they were not consolidated, and Morgan wasn't about to give them time to orchestrate a concerted action. Approaching Lebanon, he scouted for and found a little used road west of the town; and after building large, extended campfires to deceive the enemy into believing they intended to remain for a daylight attack, the Confederate column swung around Lebanon at approximately 11:00 p.m. Driving straight through to St. Mary's was difficult, as the raiders faced a stormy, night march along a rough road. It was 1:00 p.m. the following day, December 31st, before they crested another increment of Muldraugh's Hill,

and well into the afternoon by the time they reached Campbellsville. Throughout the return march, Colonel Hoskins was nipping at Morgan's heels, occasionally getting close enough to shell small detachments of the rear guard, but never closing on the main body. In less than a year, Hoskins would again pursue the elusive Morgan, only with different results. Morgan had reached the safety of Smithville, Tennessee, by the evening of January 5, 1863, where he filed this assessment of his raid:

The results of the expedition may be summed up as follows: The destruction of the Louisville and Nashville Railroad from Munfordville to Shepherdsville, within 18 miles of Louisville, rendering it impassable for at least two months; the capture of 1,877 prisoners, including 62 commissioned officers; the destruction of over \$2,000,000 of United States property, and a large loss to the enemy in killed and wounded. The loss of my entire command was as follows: Killed, 2; wounded, 24; missing, 64 (O.R. XXXII 158).

Leaving his base of supply, striking deep into the enemy's rear, and disrupting his lines of communication and supply, General John Hunt Morgan executed a classic raid. The force dispatched to meet him was inadequate from the beginning; and hampered by inaccurate intelligence, it was frequently overcautious, leading to lost opportunities. It took a civilian, Governor Morton of Indiana, to recognize what it would take to stop another such incursion.

...Morgan's force is simply mounted infantry. Very few of his men have sabers, and they fight on foot. Their horses are used only for rapid marching. They must be met by the same kind of force. I recommend that a number of regiments of infantry be mounted as soon as it can be done... Unless this is done speedily this roving, predatory warfare will instantly destroy our communications and wear out our armies (O.R. LXII 956).

The Federal army would for several months suffer from Morgan's blow; yet in spite of the damage he had wrought, and the warnings of men like Governor Morton, the Federals still did not prepare a suitable plan from protecting themselves; and Morgan would dash through Kentucky the following summer for his most famous raid of all.

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Author's Note:

Many of the battle sites described in this story are within a 30-minute drive of Fort Knox and comprise an important part of the history of Hardin County, Radcliff, and the Elizabethtown area. The next time you come to the Armor Center for ANCOC, AOAC, or some other training, you might invest a few hours with topographical map in hand doing a staff ride to gain a better appreciation of the still current tactical considerations of Morgan's Christmas Raid. Topographical map sheets covering the general area include 3859 I,II,III,IV; 3860 II, III; 3960 III; and 3959 III and IV.

Major James D. Brewer, editor-in-chief of *ARMOR*, has published widely on Civil War subjects and recently helped organize a reenactment of the Battle at Britten's Lane in Western Tennessee. He has studied the Rolling Fork skirmish for the past eight years.

Postscripts...

Like the fire-twisted rails left behind by Morgan's raiders, the lives of the three prominent Kentuckians that crossed near the Rolling Fork that winter morning in 1862 took many an odd turn for the remainder of the war and in the days after Appomattox.

John Hunt Morgan was born in Alabama, but was a planter and businessman in Lexington, Ky. when the war broke out. After the 1862 raid, he took the fight to the North in July, 1863, crossing the Ohio River into Indiana and Ohio, panicking Cincinnati, and drawing Union cavalry and militia in a running chase. On July 26, he was captured while preparing to recross the Ohio. He was confined in the then-new Ohio State Penitentiary at Columbus with many of his men. They tunneled out in a daring escape four months later. Morgan returned south to command in East Tennessee and Virginia, and was killed near Greenville, Tenn. on September 4, 1864.

Basil W. Duke, his key lieutenant and brother-in-law, was also captured in Ohio, did not escape, but was exchanged in August 1864. He rejoined Morgan and took over his command after Morgan's death, rising to the rank of brigadier general. Returning to law after the war, he served in the Kentucky legislature and - ironically - in the legal department of the Louisville & Nashville Railroad.

John W. Harlan, a Louisville lawyer before the war, returned to the practice of law and rose to the highest court in the land as an Associate Justice of the U.S. Supreme Court. His independence earned him the nickname, "The Great Dissenter".

"We have to spend more time in the school house teaching rapid orders drills. Leaders know how to prepare an order complete with annexes and overlays, but are not proficient on producing clear, concise orders under the pressure of time and stress found in combat. Rapid orders drills are the norm in combat. We need to make this part of our curriculum because there is a set of mental processes you have to train on in order to get proficient."

(COL Lon E Maggart, Cdr, 1st Bde, 1st ID, DESERT STORM, extracted from TRADOC Pamphlet 525-100-1, *Leadership and Command on the Battlefield*).

FRAGO Cards

by Major Johnny Rogers,
British Army

Introduction. The need to prepare and issue rapid orders, as stated by COL Maggart above, has been echoed in trends identified at the NTC. Bullets such as "FRAGOs are critical to all battles," or "FRAGOs given to one Bn/TF or Co/Tm at a time result in piecemeal commitment," or "a hasty attack must be a coordinated attack" have often occurred in NTC AARs. The tendency to commit Co/Tms piecemeal without coordinating direct and indirect fire support in a timely manner in response to a deviation from the planned course of action has been all too frequent.

Aim. The aim of this article is to recommend a "fix" to assist com-

manders in the issuing of FRAGOs in the field. The "fix" is called the FRAGO Card and it serves two purposes. First, it provides an operation-specific checklist to assist the commander to plan the operation and, second, it facilitates the delivery and the reception of the FRAGO to all vehicle commanders on the net. The FRAGO Card is designed for use at Bn/TF and Co/Tm level, and to derive maximum benefit from FRAGO Cards, every vehicle equipped with a radio should be issued a set. An example of how to use a FRAGO Card can be seen at the end of this article.

Concept. The concept originated with the British Army's Secure Orders Cards used throughout 1st British Corps' combat and combat support units. Each FRAGO Card provides a number of "fill in the block" options, which the commander completes (on an as required basis) as he gets the necessary information needed to execute the operation. The FRAGO Cards have been adapted to conform to U.S. Army Techniques and Procedures and are based on the same sequence as the five-paragraph field order. They can be used on secure or non-secure nets.

Operations. So far, FRAGO Cards have been developed for the following operations:

- (1) Movement to Contact
- (2) Hasty Attack
- (3) Withdrawal/Break Contact
- (4) Obstacle Crossing
- (5) Movement (Out of Contact)
- (6) Blocking Position/Hasty Defense/Counter Attack by Fire
- (7) Rear Area Operations
- (8) Attack Helo Quick Attack

Using the same concept and framework, further cards could be made for other types of operation. The example at the end of this article depicts a series of radio messages leading up to and including a FRAGO for a hasty attack.

Advantages. Integration of the FRAGO Card concept into US Army procedures offers the following advantages:

●Cross Attachments at Bn/TF and Co/Tm level. The allocation to, and the use of, doctrinally approved FRAGO Cards by all battalions would improve the ability of cross-attached and combat support units to integrate successfully with their new TF. To achieve this would require the content of the FRAGO Cards to be standardized throughout the force. Similar advantages result from using the same standardized FRAGO Cards at Co/Tm level, particularly when teams are formed consisting of non-habitually associated units.

●Formation Level. Units cross attached outside their division would find it easier to conform to their new formation if FRAGO Cards were in use by all divisions. Integrating round-out units, particularly NG units, would become considerably easier if they, and their parent formations, were trained to use the same set of FRAGO cards.

●Allies/Coalition Level. A similar system is already in use by the British, Australian, and Canadian Armies at Bn/TF and Co/Tm level. The development of a system understood and practiced by allies and coalition partners would be of considerable benefit.

●With the introduction of IVIS, FRAGO Card formats could be inte-

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grated in the software, filled in as required, and sent by burst transmission, thereby offering an improved orders transmission facility.

Video. For the integration of the FRAGO Card concept to be successful, their application should be taught at TRADOC schools. In the meanwhile, should TO&E units require a taste of how this concept works, a video has been made illustrating how to use FRAGO cards, copies of which will be available to units at the Armor Conference in May 1993.

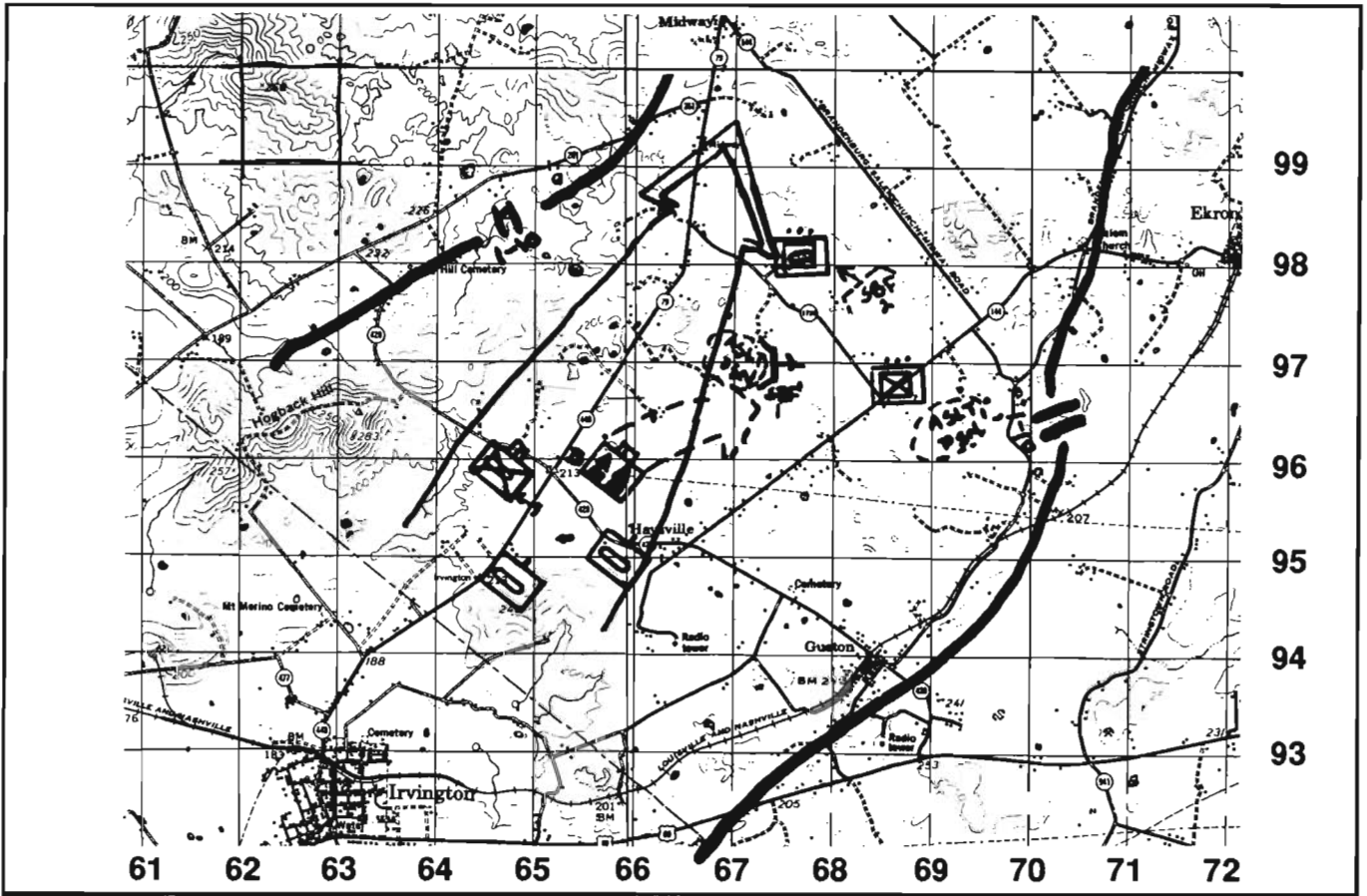
Summary. Experiences in Operation DESERT STORM and in training at the NTC have shown that improvement is needed in the preparation, issue, and execution of rapid orders. The proposed concept of standardized operation-specific FRAGO Cards offers the commander a checklist to assist in planning and synchronizing the use of the Battlefield Operational Systems under his command. In addition, all crews on the command net would be able to receive and record the FRAGO in format form. The main advantages of this concept are, first, that it provides the commander with a 'tool' for the planning and issuing of FRAGOs; second, standardized FRAGO Cards would improve the ability of cross-attached units to integrate into their new units/formations; and, finally, the integration of operation-specific FRAGO Card formats into the IVIS software would complement the considerable C² enhancements IVIS has to offer.

Scenario. TF 1-10 AR is moving to contact to exploit quickly an enemy withdrawal. The mission is to destroy all enemy en route. Pockets of enemy are anticipated — locations unconfirmed. You are the commander of Team B. At 0650 hrs, the lead platoons of the TF come under fire. The sequence at right illustrates the use of the FRAGO Card to achieve a coordinated hasty attack. A map and overlay of the situation appears on the following page, along with a typical FRAGO card filled out to illustrate its use in this situation.

<u>Serial</u>	<u>Time</u>	<u>Event</u>	<u>Concurrent Activity/Explanation</u>
1.	0650-0700	Lead plts report 3x T72s, 3 x BMPs and dug in inf at 678980 and 685970	Tm Cdrs pass info to TOC
2.	0700	TF Cdr orders Tm B to destroy enemy, and rest of TF bypass and continue mission with Tm A leading	Cdr Tm B completes lines 5 & 6 of FRAGO Card # 2, decides to go right flanking, IDs serials on Card # 2 he wants to use, and at 0705 issues a warning order.
3.	0705	'Guidons, this is V20 Warning Order. FRAGO Card #2 * Line 6: 2xT72s, 1xBMP and dug in inf* at 678980* Line 8: 1xT72, 2xBMPs and dug in inf* at 685970* Mission - Line 37* Line 40: Ph 1: 685970* Phase 2: 678980* Line 65: 0720* H31 and M31 to ID possible Line 58s & 76s for Ph 1 & 2, over'	This Warning Order focuses Tm B on enemy strength & locations, the mission, a 2-phase operation with a LD time of not before 0720, and tasks 2 plts to find good support by fire and assault positions for both phases. H31 = 1st Tank Plt M31 = 2d Tank Plt I31 = 3d Mech Plt S31 = 4th Mech Plt
4.	0710-0715	The lead plts report good SBF positions (58) at 668970 (Ph 1) and 680975 (Ph 2); and good asslt positions (77) at 693962 (Ph 1) and 668970 (Ph 2).	B Tm Cdr confirms these positions, and completes the rest of the selected lines of the FRAGO Card.
5.	0720	'Guidons, this is V20, FRAGO Card #2. No change to Warning Order.' Additional lines follow: Line 41: Ph 1 Right Flank Ph 2 Frontal* Line 51: Ph 1 M31 and S31 Ph 2 H31 and I31* Line 56: Ph 1 H31 Ph 2 M31* Line 58: Ph 1 668970 Ph 2 680975* Line 59: Ph 1 I31 at SBF position Ph 2 S31 on Ph 1 obj* Line 66: Ph 1 0730 Ph 2 0745* Line 67: Ph 1 H to H+3 Ph 2 H-12 to H+3* Line 69: Ph 1 H-8 to H+3 Ph 2 H-12 to H+3* Line 77: Ph 1 693962 Ph 2 668970* Line 89: For both phases Acknowledge, Over.	B Tm Cdr goes with Asslt element. B Tm XO goes with SBF element (TF SOP). This FRAGO illustrates a synchronized 2-phased hasty attack with Asslt, SBF, and Reserve elements supported by smoke and FA for each phase.

* Denotes 'break'

Figure 1. Sequence of Events: Using the FRAGO Card to Organize a Hasty Attack



FRAGO Card 2

Used to plan a hasty attack

EST EN LOCS

04 SECTOR FROM TO	GRID	GRID
08 EN LOC	678980	2x772, 1x8mp & dug in Inf
08 EN LOC	695970	1x772, 2x8mp & bag w Drf

FRIENDLY FORCES

	MISSION
23 RIGHT FLANK	31 SEIZE
25 LEFT FLANK	34 SECURE
	35 SUPPRESS
	36 CLEAR
	37 DESTROY

OUTLINE AND TASKS

	PHASE 1	PHASE 2
40 GRID OF OBJ	685970	678980
41 ATK DIR CODE	RIGHT	FRONT - AL
51 ASLT ELEMENT	M31 S31	H31 I31
56 SBF C/S	H31	M31
56 FROM GRID	668970	680975
56 REB/DEPTH C/S	I31	S31
56 FLNK SEC C/S		

COORD INSTRS

	PHASE 1	PHASE 2
64 ASLT POS SECURE BY		
66 H HR NOT BEFORE _HRS	0720	
66 H HR AT _HRS	0730	0745

FIRE PLAN SEND (+) OR (-) IN CLEAR RELATIVE TO H HR

	PHASE 1	PHASE 2
67 HE FROM ON OBJ TO	H	H-12
68 MORTARS ON FROM OBJ TO	H+3	H+3
69 SMK FROM ON OBJ TO	H-8	H-12
70 ILLUM ON FROM OBJ TO	H+3	H+3
71 HE FROM ON CALL TO		
73 TRIP'S FROM GRID TO		

LOCATIONS

76 ATK PSN GRID									
77 ASLT PSN GRID	693942	666897	0						
80 RFL									
81 TO GRID									

MOVEMENT

82 ORDER OF MARCH BY C/S									
84 ROUTE TO OBJ VIA GRID/CP									
85 BEARING FR ASLT PSN TO OBJ									

	PHASE 1	PHASE 2
88 ON OBJ		
88 AT GRID		
89 ON MY ORDERS		

MOUNTED/DISMOUNTED

90 RETURN TO ASLT POS									
91 DISMOUNT LINK-UP PT GRID									
92 FIRE SP FROM GRID									

REORGANIZATION

93 CALL SIGN									
96 LIMIT FROM OF ADVANCE TO									

FY92 Abrams Vehicle Fires: An Improvement

by Gregory M. Skaff

The subject of combat vehicle fires has always been an extremely critical area to the Army and especially to the Armor force. This concern is in the most part focused at protecting operators and maintainers from serious injuries or death. The effects associated with vehicle fires can also be extremely costly in terms of equipment damage, combat effectiveness, and overall soldier confidence in his equipment.

The Armor Center receives the fire and accident reports on all Armor proponent systems and analyzes the information to identify potential trends and possible safety issues. In recent years, many agencies have exerted numerous efforts to reduce the number of vehicle fires on Abrams series main battle tanks. The Abrams has received this emphasis because fire analyses have revealed definite trends and fire prevention measures. This article highlights some of the vital information obtained.

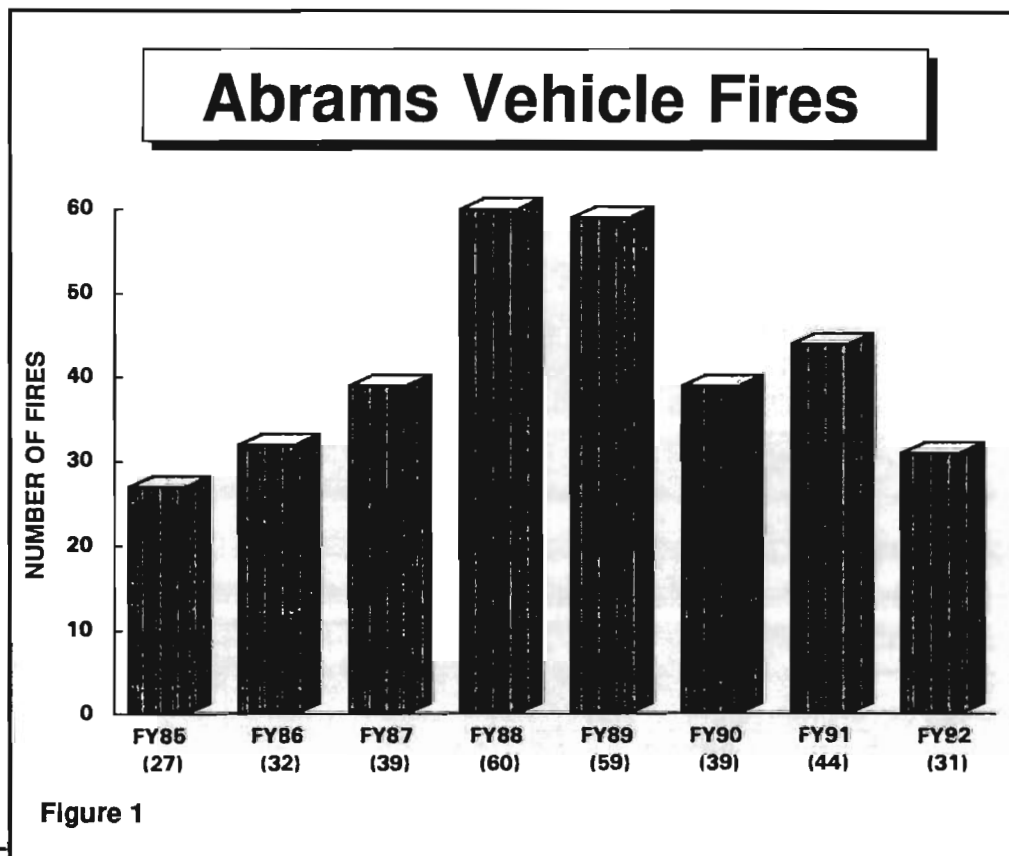
There were 31 Abrams vehicle fires reported during fiscal year 1992 (FY92), the least number of fires in recent years (Figure 1). These vehicle fire reports have been analyzed very carefully and compared to earlier fire reports in terms of fire cause and location, vehicle type and age, means of extinguishment, etc. Many interesting facts were identified and improvements noted. First, the average cost of an Abrams fire during FY92 was \$38,709, compared to the \$155,000

FY91 average cost per fire. Hard work, risk assessments, and sound leadership provided the payoff. This information highlights an extremely important fact which needs to be stressed: continual safety awareness and sound safety practices save human lives and other valuable resources, which in turn reduce costs.

The major cause of Abrams vehicle fires continues to be human error. Fifty-four percent of the fires reported during FY92 were directly related to crew and maintenance shortfalls, which is an 11 percent decrease from the previous FY. Even though this was an improvement, we can strive for greater reductions. The following report summary is from an actual

Abrams fire caused by human error. It could have resulted in a very serious situation to the soldiers and unit involved:

An M1IP tank was on the firing line being prepared for gunnery. The personnel heater was in operation, providing heat to the crew during a cold January day. The turret was positioned such that the hot air from the personnel heater was ducted directly onto four propane cans which were stowed in the loader's station. The propane cans were being used to fuel a portable gas stove. The propane cans exploded, causing a fire within the turret. Three crewmen suffered smoke inhalation injuries with one receiving flash burns to his face and



second- and third-degree burns to his hands. This incident shows that the survivability features of the Abrams tank do work. The fire suppression system functioned properly, suppressing the explosion, and the ammunition compartment doors prevented unloaded ammunition from burning. However, because basic operational guidelines were not followed, a potentially catastrophic situation occurred. This was not an isolated incident, because just a month and half earlier a spray paint can exploded behind the driver's station in another M1IP tank.

Another trend which continues to surface is the relationship of vehicle age to the number of vehicle fires (Figure 2). Most of the Abrams vehicle fires occur on M1s that are five years old or older. During the period FY90 through FY92, nearly 80 percent of the fires occurred on these older tanks. Special care and inspection must be given to those vehicles that have been in the field for awhile. This is true not only for tanks, but for any complex system. Older tanks will tend to have worn cabling, loose hardware, dirty sensors, and other flaws. These signs of wear and tear are also signs of potential fire locations. Furthermore, these older vehicles may not have all the fire protection modifications that are on newer vehicles coming off of the tank line. Soldiers must ensure that required equipment modifications have been made to their equipment. The bottom line is that additional care and thorough inspection are required with older vehicles.

All the areas discussed above — overall damage cost, number of fires, and fires attributed to human error — showed improvements when com-

Abrams Vehicle Fires by Vehicle Age Fires Occurring FY90 thru FY 92

VEHICLE AGE	NUMBER OF FIRES
13	4
12	3
11	15
10	8
9	17
8	19
7	10
6	5
5	9
4	4
3	5
2	2
1	0
UNK OR TEST VEH	13
114 Fires	

90 of the last 114 Abrams vehicle fires have occurred on vehicles which are 5 or more years old.

68 = M1 or M1IP
33 = M1A1
13 = Info not known or test vehicle

Figure 2

pared to prior fiscal years. The most stupendous improvement, however, is that this is the first fiscal year since the first unit was equipped with the Abrams that there have been fewer fires during the last half of the FY compared to the first half. The significance of this is that the majority of Abrams fires typically occur during the fourth quarter of the fiscal year, when Active and Reserve Component summer training is at its peak. During FY92, 18 of the 31 fires occurred during the first half of the fiscal year, leaving a total of 12 fires during the last half of the fiscal year. One must look all the way back to FY84 to find a fiscal year which had fewer than 12 fires during the last two quarters.

The FY92 Abrams fire data indicates that hard work and increased fire awareness reduce the number and severity of Abrams fires. Intense efforts were aimed at Abrams fire protection by numerous agencies; however, the soldiers in the field, who actually make the final turns of the wrench and the decision to move out or stay, are the ones deserving the "Job well done." In all aspects of the Abrams

fire analyses, FY92 is the best on record. Remember though, the work is not complete! Fuel and electrical problems continue to cause the majority of fires, and there are still some maintenance and crew tasks not being performed to standard. The Abrams fire analyses have clearly concluded one common trend: procedures not followed or fully completed result in fires.

Mr. Gregory M. Skaff has been the Armor System Safety Engineer for the Armor Center's Directorate of Combat Developments and Armor Branch Safety Office since 1987. He has a Bachelor of Science Degree in civil engineering from West Virginia University and an MS in environmental health and safety management from Indiana University.

Combat Service Support for the Task Force Scout Platoon

by Captain Michael L. Maus



Providing logistics support for the Task Force Scout Platoon is currently a critical problem. FM 17-98, *Scout Platoon*, even states, "The scout platoon presents a complex logistical problem for the battalion staff." How are we going to keep eyes and ears forward in sufficient quantities to support the commander's requirements? Answers to these questions will be the focus of this article, and I will show one method which worked successfully for my task force during a rotation to the National Training Center and during Operation DESERT STORM.

Current doctrine gives the task force three options for resupplying the scout platoon. The first is to have the scouts use the nearest company team's CSS assets. There are several problems with this method. The company team commander must realize the importance of supporting the scouts and must give them priority when they come for resupply. Also, the task force staff must plan this support in advance so that the supporting company's first sergeant and the scout platoon understand the resupply plan and are rehearsed to execute it. Inherently, the scout platoon may not always be able to resupply at the designated task force LOGPAC time due to their mission. They may require a special LOGPAC time, and the supporting company's first sergeant will be stretched even more than he already is. This method can work for Class I, III, and V, but maintenance and medical support are very difficult. If a tank company is supporting the scouts, they may not have enough mechanics to support the scouts, forcing the

scouts to go longer without their equipment. Medical support is also extremely difficult because, in most cases, the first sergeant is going to evacuate his casualties first, leaving the scouts to evacuate their own. Both scenarios take scouts away from their reconnaissance mission.

A second method is to make the scout platoon responsible for their own LOGPAC. This method forces the platoon sergeant not only to coordinate for resupply, but also to take himself away from the reconnaissance mission to pick-up, distribute, and return the LOGPAC. This stretches the scouts to the limit and takes the most experienced scout out of the reconnaissance mission for extended periods of time. In the M3 scout platoon, this method has just taken 17 percent (10 percent in the HMMWV scout platoon) of the task force commander's organic "eyes and ears" out of the forward battle area. This is the easiest method of resupply for the task force, but is very hard on the scout platoon.

The third method is to provide a dedicated maintenance team and logistics package to the scout platoon. This team responds to the needs of the scouts and is dedicated to keeping the platoon combat effective. FM 17-98 suggests the headquarters company first sergeant or the support platoon leader bring this team forward. However, we know that these key leaders are very busy and have many other responsibilities to tend to. Therefore, many questions arise to the make-up of the scout CSS team. Such as, how do we outfit this "team"? Who is in charge of the team? What equipment

do they use, and who is involved in the team? These assets must be taken out of the task force's own organic assets because none are addressed in the current MTOE. Here's how our task force used this technique and the equipment we used.

Organization And Equipment. The logistics team worked out of an M113A2. (We used the ALO's vehicle.) The task force commander, LTC Marlin, placed a sergeant first class from the S3 section in the track and gave him the title of scout field first sergeant. He also had three soldiers working with him. They were a scout driver, a medic, and a Bradley mechanic. These assets would allow for resupply, maintenance, and medical evacuation of the platoon.

Operations. The field first sergeant had two radios in the M113A2 and operated on the scout platoon net and the admin/log net. This allowed the scout platoon sergeant to stay on the task force command net with the platoon leader and ensured immediate, accurate reporting of the current situations to the task force commander.

The field first sergeant normally stayed one terrain feature behind the platoon and centered in sector. If additional security was required, he would stay with the center section and could easily respond to any situation arising. By having the mechanic and medic on board, the field first sergeant could respond to any mechanical or medical problem while the platoon could continue to focus its efforts forward in the recon battle. The mechanic could provide quick maintenance support and usually got the vehicle back into the fight within 30

minutes. If additional maintenance was required, the field first sergeant would report the problem to the UMCP and task force assets would respond to the situation. By having the medic aboard, casualties could be stabilized very quickly and evacuated to the battalion aid station (normally within 30 minutes)

LOGPAC. The field first sergeant would go to the logistics release point (LRP) and pickup the scout LOGPAC. A TPU was the usual fuel truck for the platoon, which normally provided plenty of Class III. A HEMMT would be used if the platoon required the additional fuel. The field first sergeant would bring the LOGPAC forward and would radio the platoon sergeant to alert him that it was coming forward. The platoon sergeant would determine the platoon LOGPAC site, and the field first sergeant would set up the site. The ser-

vice station method was normally used for all operations. The mechanic would review the DA Form 2404s and the medic would tend to any medical needs while the field first sergeant and the driver issued Class I and exchanged water cans with the crew. The platoon sergeant would normally setup with the field first sergeant at the LOGPAC site to provide security and allow him to check on the soldiers of the platoon.

When returning the LOGPAC, the field first sergeant would stop by the UMCP to drop off the 2404s and check on any down equipment from the platoon. This provided the platoon leader very accurate reporting of his equipment and allowed him to know when he could expect the equipment to return forward.

This concept proved itself during many field training exercises at Ft. Riley and during my rotation at the

Captain Michael L. Maus was commissioned in 1987 from the U.S. Military Academy. A graduate of the AOBC, Airborne, SPLC, JOMC, and AOAC courses, he served as a tank platoon leader and scout platoon leader in 4-37 Armor, aide-de-camp to the ADC (Maneuver), and squadron maintenance officer in 1-4 Cavalry, 1st Infantry Division. He is currently working for Lifework, a personnel consulting firm.

National Training Center. The most important thing to remember is that resupplying the scout platoon is very important and must be rehearsed and practiced, regardless of which method is used.

Has Gun...Will Travel

The M109A6 Paladin 155-mm SP Howitzer is due to join the force in June 1993

It looks a lot like the last version of the M109-series self-propelled howitzer, but the new A6 version, dubbed the Paladin, is a lot smarter.

What makes it unique is its speed in responding to calls for fire, a responsiveness measured in seconds, rather than minutes. The new gun system can consistently receive, process, and fire at targets within 30 seconds, if halted, and within 60 seconds when on the march.

What makes this possible is a new fire control system incorporating a position navigation system that constantly updates the system's ballistic computer. This cuts the processing time necessary before the round can be on the way, and ensures that the Paladin can reposition itself more quickly, too, improving survivability.



An improved cannon and gun mount extends the range approximately 6 kilometers. The system can fire the full range of 155-mm projectiles, including illumination, dual purpose improved conventional munitions, scatterable mines, and high explosive

Paladin can fire assisted projectiles to a range of 30 kilometers.

A Paladin platoon is currently at the NTC with a rotation of the 1st Cavalry Division to demonstrate its increased capabilities to "shoot and scoot."

Driver's Seat *(Continued from page 7)*

lows for completion of courses, but restricts student enrollment.

To this point, I have addressed the commander's responsibilities and the methods to fulfill his responsibility. There are two additional areas that must be considered: The soldiers and the Education Center.

Soldiers must understand their responsibility to further their education. A number of sources provide the soldier with information to assist in establishing educational goals. For example, the CMF 19 career map recommends that an Associate of Arts or Science degree in Interdisciplinary Studies, Applied Management, General Studies, or Automotive Maintenance be completed by 15 years of service.

The importance of an education cannot be understated. The amount of

college attended may be a deciding factor on promotion boards when all other things are equal.

Finally, the Education Center and its staff play a major role in this education effort. They must work toward providing nontraditional ways of presenting instruction. For example, video teletraining and computer-based or correspondence instruction make the instruction available to the student on an as-needed basis. Beyond that, Education Center administrators should consider certifying soldiers within units to instruct their peers or subordinates.

Minimizing costs is another way Education Centers can provide assistance to the soldier. Education centers could contact colleges to provide instruction for longer periods, resulting in books

remaining the same and allowing book banks to be created.

Regardless of the approach taken, the challenge is to create a program providing quality higher education for soldiers. The education of soldiers benefits not only the individual but the Army as well. Leaders who use "mission" as an excuse for not ensuring their soldiers have the opportunities to educate themselves are failing at their responsibilities.

Sergeant Major Douglas K. Merrill has served as NCOIC of the BNCOIC Task Force and sergeant major of the Directorate of Training Development, U.S. Army Armor School. Most recently, he served as command sergeant major of the Armor School from March 1992 to February 1993.

1993 Armor Conference Agenda

4-6 May 1993

"Mounted Warfare Now and Into the Next Century"

Tuesday, 4 May 1993

<u>Time</u>	<u>Activity</u>	<u>Location</u>
0900-2200	Registration	Officer's Club
0800-1700	Displays	Skidgel Hall
1300-1400	Honorary Colonels of the Regiment	HQ Conference Room
1500-1600	Presentation	Gaffey Auditorium
1645-1730	Retreat Ceremony	Brooks Field
1800-1930	CG's Garden Party	Qtrs 1
1930-2130	Buffet and Regimental Assemblies	Brick Mess

Wednesday, 5 May 1993

0730-0830	Stand-To Breakfast	Brick Mess
0900-0915	Welcome/Opening	Gaffey Auditorium
0915-1010	Keynote Address	Gaffey Auditorium
1030-1200	Presentations	Gaffey Auditorium
1200-1230	Armor Association Awards	Gaffey Auditorium
1200-1400	Lunch/Displays	
1400-1630	Presentations	Gaffey Auditorium
1800-2200	Armor Association Banquet and General Membership Meeting	
1800	Cocktails	Patton Museum
1900	Banquet and Speech	Armor Inn
0800-1700	Displays	Skidgel Hall

Thursday, 6 May 1993

0630-0800	Armor Assn. Executive Council Meeting	Brick Mess
0800-1200	Presentations	Gaffey Auditorium
1215-1315	Chief of Armor Luncheon	Brick Mess
1330-1550	Presentations	Gaffey Auditorium
1600-1615	Farewell Remarks	Gaffey Auditorium
0800-1500	Displays	Skidgel Hall

•POC for general officers billeting: Protocol Office, DSN 464-2744/6951, commercial (502)624-2744/6951.

•Limited on-post billeting may be available for other personnel. Contact DEH, Mrs. Easter, DSN 464-3138/3943, commercial (502)624-3138/3943.

•POC for equipment displays: DCD, CPT Byington, DSN 464-4412, commercial (502)624-4412.

•Overall POC for Armor Conference: CPT Topp, DSN 464-1065, commercial (502)624-1065.

•Conference uniform is battle dress uniform; banquet is coat and tie; garden party is BDU, casual, or Class B with short sleeve shirt and open collar.

•Tickets for social functions will be sold during registration. Ticket sales will stop promptly at 1000 hrs, 5 May (estimated cost of social events - \$60.00).

•Security clearance notifications for this conference are not necessary because this conference is unclassified.

•Visit requests for foreign nationals must be submitted through their embassies in time to allow for normal processing.

Rehearsals for War: A Prescription for Success

Large scale sand table exercises like the one at right, helped prepare troops for the assault that opened DESERT STORM's ground warfare phase.

by Major Wesley E. Barbour



The success of Operation DESERT STORM in 1991 can be linked to many lessons learned in the past; one lesson was the value of the rehearsal. On a similar desert almost a half century earlier, General Bernard Law Montgomery brought his principles to a battered British Eighth Army. One principle was the absolute value of the battle rehearsal at every echelon from corps down to the crew and squad level. His devotion to rehearsing every action in battle brought victory after victory in the desert. This article will describe how the 1st Brigade of the 1st Infantry Division (America's Team) rehearsed the missions that were executed during Operation DESERT STORM, during both predeployment and deployment.

August 1990 was the beginning of the story of Operation DESERT STORM for the units that were to eventually deploy to Southwest Asia. An educated assessment led the staff and commanders of the 1st Brigade to conclude that the division would deploy in the coming months. At that time, the planning focus of the brigade was on the National Training Center (NTC) rotation exercise slated for May 1991. The brigade consisted of two armor battalions, the 1st and 2d Battalions, 34th Armored Regiment; 5th (later redesignated 1st) Battalion, 16th Infantry Regiment; 1st Battalion, 5th Field Artillery; the 101st Forward Support Battalion; and

the 9th Engineer Battalion. Many of the predeployment actions for the NTC eventually became our predeployment actions for DESERT STORM. Each previous NTC rotation had, in effect, been a rehearsal for brigade leaders. The brigade and battalion S2 officers began to study the history of the Iraqi Army in the Iran-Iraq War. Several distinct patterns emerged in how the Iraqi Army would fight a defensive battle against an attacking force. The intelligence estimate in late August produced graphic representations of a string of triangular fortresses along the Kuwaiti border with Saudi Arabia. The brigade commander used a sand triangular fortress in discussions with his maneuver commanders in August and September, while company commanders led OPD sessions on sand tables. These initial discussions, seven months prior to battle, laid the foundation of shared knowledge among the commanders. As the first real rehearsals of what was to come, discussions focused on butcher board drawings of the triangular fortresses and the forces needed to overcome them. What became immediately apparent was the high number of dismounted infantry and combat engineers needed to overcome obstacles and execute a breach in support of an armored penetration. This was one of many issues extensively wargamed and rehearsed before deployment.

In late fall, the brigade was alerted for movement as part of the offensive options outlined in Defense Secretary Cheney's November announcement. We simultaneously received new intelligence information that revealed the presence of linear obstacle belts in depth. Intensive study on how to breach the wire fences, oil fire trenches, and interspersed minefields covered by fire from tanks and artillery became our focus. With video tapes hastily prepared at the NTC, the battalion commanders and brigade staff began to devise a plan to breach the obstacle belts. These plans were rehearsed on chalkboards and sand tables down to battalion and company level prior to deployment in late December.

The brigade rehearsals were following the template outlined in FM 71-123, *Tactics, Techniques, and Procedures for Combined Arms Heavy Forces*. During the predeployment period, the rehearsal technique was the Level I, which uses butcher boards for wargaming and sand tables for walk-throughs. Simple Level I rehearsals identified critical tasks to be accomplished by each member of the team. The next technique was Level II, scaled rehearsals with key leaders. Level III was a full-dress rehearsal with all participants, executed on full-scale terrain models that would enable soldiers to rehearse critical actions on the objective. Upon deployment, the

Level II and Level III rehearsals were conducted as the plan was refined prior to G-Day, the start of the ground war. Each rehearsal technique requires a corresponding amount of time, preparation, and logistical support; the Level I rehearsal requiring the least, the Level III the most.

January 1991 found the 1st Brigade in the north central desert of Saudi Arabia after deployment from Fort Riley. As intelligence confirmed the size and scope of the obstacles facing the brigade, the orders, brief-back, and rehearsal process began in earnest at every level from brigade to individual soldier. No longer confined to chalkboards, the graphics for the brigade breach were laid out in the desert sand covering an area usually averaging 40 feet long and 20 feet wide, depicting every terrain feature possible. Accuracy of scale was attained through detailed analysis of aerial photographs. Most important was that this effort was duplicated not only at the brigade TOC but in the brigade support area so as to rehearse logistical support for the operation. Subordinate battalions of the brigade built elaborate sand tables for Level I rehearsals. These were of higher quality than those built for previous NTC rotations. Construction of these tables usually averaged eight hours, and we used available materials, to include paint, to represent objectives, terrain features, phase lines, and the correlation of forces.

The opportunity to practice actions on the objective using a scale model of the breach area proved to be a key to success. The 9th Engineer Battalion constructed a portion of the enemy obstacle for Level II and Level III company team rehearsals in early February. Combat engineers also constructed smaller replicas of Iraqi obstacles for specialized demolition rehearsals and trench clearing. The objective of each rehearsal was to ensure each unit and soldier knew his role in combat, and to train every task possible. In a period of a few short days,

small units became more skilled, cohesive, and confident in their training. By the 10th of February, it was apparent that nearly 30 days of training and extensive rehearsals had transformed units of the brigade into combat-ready organizations. On the 11th of February, the brigade conducted a Level III full-dress rehearsal that moved the massed battalions and companies across the Saudi Arabian desert. During this rehearsal, formations were perfected, command and control exercised, orders refined, and equipment tested for the battle to come. The move across the desert from TAA Roosevelt to east of Wadi al Batin on the night of 13-14 February was, in effect, a Level III rehearsal for the constant movement during the 100-hour war. Once in the final attack positions, we continued to rehearse battle drills as we waited for the order.

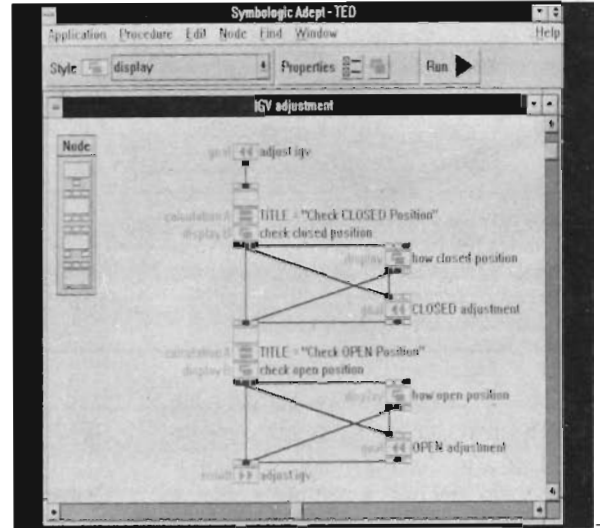
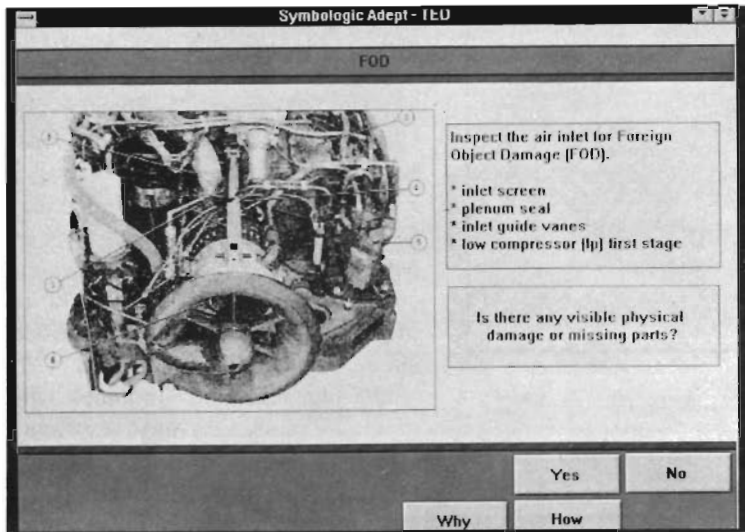
The brigade continued to rehearse as it took up positions along the Saudi Arabian-Iraqi border on 17 February and encountered enemy reconnaissance elements for the first time. Each night and day for the next six days acclimatized the brigade soldiers to the nature and intention of the enemy as a game of cat and mouse ensued along the border between American and Iraqi reconnaissance patrols. As recon patrols began to move, Iraqi flares lit the sky, and 4.2-in. mortars and artillery fired back in response. Tankers and Bradley crewmen began to see the faint glow of T-55s, BMPs, and recon patrols in the thermal sights, and for the first time, they issued fire commands against live targets. At the dawn of each day, the experience gained passed among units as a result of this most unique rehearsal for war. The first prisoners captured provided invaluable intelligence and a precursor of the prisoner of war phenomena in the coming week.

The flawless execution of the breach was testimony to the success of the brigade rehearsals. Swift, violent execution, with no fratricide, characterized the intended outcome of the re-

hearsals that took place from August to February.

Four factors made these rehearsals effective. First, a clear understanding of the enemy intention and the commander's intent. Second, pursuit of perfection in replicating — on butcher board, sand tables, and full-scale models — the terrain, obstacles, and enemy dispositions the rehearsing force will fight. Third, effective use of time, as the month prior to the beginning of the ground war afforded the opportunity to conduct Level III rehearsals on full-scale replicas of those to be encountered in the actual breach. These built on previous Level I and Level II rehearsals conducted prior to deployment. Fourth, and most important, drilling to perfection, through the individual to collective task tree, what must be done to accomplish the mission during every rehearsal, and making the required adjustments to the plan during the orders process. Whether a squad drill or the complex synchronization of a brigade in the attack, the relentless rehearsal and AAR process were the keys to the division's success in DESERT STORM. Moreover, the value of Montgomery's devotion to full-up combat rehearsals for the attacks on Tobruk and El Alamein have been confirmed on the Arabian desert a half century later against a different enemy.

Major Wesley E. Barbour Jr. is a distinguished Military Graduate of Campbell University. Commissioned in Infantry, he has served in mechanized infantry battalions of the 16th Infantry, 1st Infantry Division in Germany and Ft. Riley. During Operation DESERT STORM, he was a member of the 1st Brigade, 1st ID staff. He recently served as the S3 of 1st Battalion, 16th Infantry. He is currently a student at the U.S. Naval War College.



Two views of the computer screen during diagnostics on the M1 tank engine using the Turbine Engine Diagnostics expert system, TED guides the mechanic through a procedure, points to possible problem areas, suggests courses of action, lists the parts necessary for repair, and even prints out the paperwork for the parts order. (Photos courtesy of Symbologic Corporation)

Technology and Tank Maintenance

by Captain Mark C. Malham

Since our triumph in the Gulf War, one can no longer doubt the Abrams' superior technology. However, this technology has created a logistical burden (fueling and fixing) which maneuver commanders often consider troublesome. HEMTT fuelers have helped quench the Abrams' insatiable thirst for fuel. However, the Abrams' technology continues to challenge our mechanics. Thus, in addition to quality training, they deserve sophisticated, yet user-friendly, equipment to maintain the fleet. As an Armor officer assigned to Directorate of Combat Developments (DCD), U.S. Army Ordnance Center and School (USAOC&S), I'm witnessing efforts to assure readiness of this formidable but complex system.

The Ordnance maintenance vision emphasizes maximizing the operational readiness of battlefield systems.¹ This vision also emphasizes employing appropriate technology to accomplish the mission. Hence, DCD's Knowledge Engineering Group (KEG) won grants from Strategic Logistics Agen-

cy (SLA) and Headquarters, Department of the Army to develop expert systems, to teach mechanics diagnostic skills.

Expert Systems Defined

Expert systems employ human knowledge captured in computers to solve problems that ordinarily require human expertise. They can be used by nonexperts to improve their problem-solving capabilities.² Expert systems are applicable to maintenance operations because they spread a wealth of knowledge among junior and senior mechanics. This means that skilled maintenance supervisors and technicians, who already are too few, now render advice as necessary instead of having to constantly monitor junior mechanics' diagnoses and repairs.

An expert system consists of two main elements: a knowledge base and an inference engine. The knowledge base is the assimilation of information related to a specific field. The inference engine represents the "brain" of

the expert system; it performs the reasoning function. This paper discusses potential knowledge bases. Understanding the inference engine's methodology is beyond the scope of this paper.

KEG Expert Systems

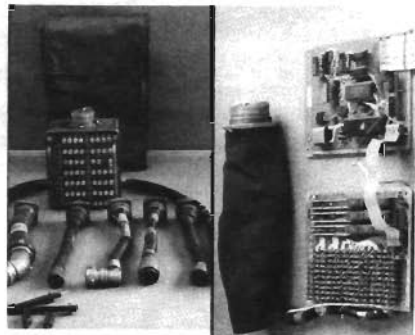
KEG is working on two Abrams-related expert systems, both in prototype stages of development. The first is the Diagnostic Intelligent Tutoring System (DITS); the other is the Turbine Engine Diagnostics (TED).

DITS is a prototype distributive training software package for maintenance personnel. Its purpose is to sustain the perishable diagnostic skills of both Active and Reserve Components direct support (DS) mechanics. DITS is unique compared to other training programs; it provides the mechanic an appropriate level and amount of diagnostic and trouble-shooting training, based on an analysis of his or her skills, experience, and learning style. In other words, each mechanic re-



CTS III diagnostic computer, above, which is linked to the tank engine by a 129-pin connector through an RS-232 port. Connectors and circuit boards are at right.

(Photos courtesy of Symbiotic Corporation)



ceives a tailored software program. DITS also serves as a management tool. It affords supervisors the opportunity to access a soldier's file to monitor his or her progress, strengths, and weaknesses.

The first DITS was developed using troubleshooting procedures for Abrams' Thermal Imaging Sight (TIS) as the knowledge base proof-of-principle. To validate the contractor's expert system, a subsequent prototype is being developed using troubleshooting procedures for the AGT-1500 engine as the knowledge base.

Complementing DITS, TED teaches direct support mechanics how to diagnose and repair a specific system: the AGT-1500 turbine engine. It provides troubleshooting, repair procedures, and parts ordering capability that are not otherwise currently available. The focus is on performing a pre-shop analysis and a system health check on a Full-Up Power Pack (FUPP). Once its operational condition is determined, the system will conduct a fault diagnosis. Based upon the diagnosis, the mechanic will be guided through ordering and repair procedures.³

The repair procedures incorporate an electronic technical manual (see below), provide an estimated time required to repair, delineate what MOS is needed to perform the repair, and list any special tools or Test Measurement and Diagnostic Equipment (TMDE) required.⁴ Like DITS, TED is tailored to the individual. TED accomplishes this by incorporating three levels of expertise: expert, novice, and apprentice. It also facilitates

user interface via HOW, WHY, HELP, and TOOLS buttons.

Other Initiatives

Two additional projects, although not expert systems, still incorporate technology to enhance the force. They include the Automatic Breakout Box (ABOB) and the Interactive Electronic Technical Manual (IETM). ABOB is a Breakout Box (BOB), which is currently fielded with the Abrams and Bradley-series vehicles, modified with a circuit card. KEG and Army Research Laboratory (ARL) jointly developed it and have submitted it for a U.S. patent.

ABOB provides the linkage between the vehicle being diagnosed and the CTS III by converting analog data to digital data. The device automates the manual tasks of taking separate digital multimeter readings, performing mathematical calculations, and analyzing the readings, significance via a text-based diagnostic flow chart. Using a personal computer (PC), ABOB can select any of BOB's 128 pins and report its voltage to the PC in a fraction of a second.⁵

IETM was scanned by Hercules Defense Electronics Systems Corporation. By assuring its proprietary software, we were able to profit from its work for the Navy's Aegis class cruisers. We use the Battlefield Damage Assessment and Repair (BDAR) Manual as a proof of principle for soldier validation. It offers numerous advantages over paper manuals. These include quicker access to information, instant page flipping, weight reduc-

tion, lower cost of manual production and distribution, and less paper storage.

DITS, TED and IETM function on a Contact Test Set (CTS) III; no new hardware is required. But the system requires a 386/486 computer running Microsoft Windows 3.1 with at least 4 MB of RAM and 80 MB hard drive.

These represent only a few of the ideas that the KEG has developed since receiving its charter in 1991. While they focus on the maintenance of the Abrams, they also represent a pioneering effort to use expert systems in other areas of training. It is key that we remain on the cutting edge of technology within our force projection Army.

Notes

¹Department of the Army, *The Ordnance Corps Vision*, Aberdeen Proving Ground, Md., USAOC&S, 1992, p. 1.

²Efraim Turban, *Decision Support and Expert Systems*, New York, Macmillan, 1990, p. 424.

³Orlando J. Illi Jr., *Expert Diagnostic System Development*, Third Symposium of International Association of Knowledge Engineers, 1992, Washington, D.C., p. 689.

⁴*Ibid.*

⁵*Ibid.*, p. 690.

Captain Mark C. Malham was commissioned as a Distinguished Military Graduate from the University of Illinois in 1982. After AOBC, he served as a platoon leader, mortar platoon leader, and executive officer, 2-64 Armor, 3d ID, Schweinfurt, Germany. After AOAC, he served as a squadron S4, company commander, and assistant regimental S3, 3rd ACR, Fort Bliss, Texas. In 1990, he entered the Acquisition Corps and subsequently earned an MBA from University of Texas. He is also a graduate of CGSC. He is currently assigned to U.S. Army Ordnance Center and School, Aberdeen Proving Ground, Md.

Philosophy of Command for the Company/Troop Commander

by Captain Harold L. Meyer Jr. and Captain Kenneth C. Blakely

"XO, I need to see you, the first sergeant, and all the platoon leaders and platoon sergeants in my office after the reception."

"Roger, Sir," your XO replies as he turns to gather the leaders of your new company.

You've just taken command of your first company. After making a few choice comments to the troops, you have released them for the day. You now have all the company's leaders to yourself. As you walk into your new office after the reception, you see that they have arrayed themselves against the wall. They may not even realize it themselves, but they are looking for a direction from you. What will you tell them? How will you allay their fears and anticipations? In the scant few minutes that you have, what will you give them to let them know who you are and what they can expect from you?

Hopefully, you have already done some serious thinking, and you already know what to tell them. What they are looking for, and what you should be able to tell them from square one, is your philosophy of command. They may not call it by that name, but what they're looking for is an encapsulation of what is important to you — what makes you tick. They want to know how you think, what are your triggers, and how you will command this company. They don't want to know your policies — that

will come later. Right now, what they need is a quick rundown on you.

Philosophy of command has become somewhat of a buzzword of late. Students at AOAC must write one, and most new commanders publish one in the first few days of their command. In fact, a philosophy of command has become a de facto requirement in many units, alongside policy letters and safety briefings. Unfortunately, no



one has quantified it yet, and there is considerable confusion about what it really is. Some officers consider it nothing more than a big policy letter, and they end up writing ten- or twenty-page philosophies of command which few people read and fewer understand. Like the commander's intent, which was inserted into the five-

paragraph field order and then debated by service schools and doctrinal instructors, the philosophy of command has been made a requirement with no accompanying guidance on what it is and how to write it.

The bottom line is that we need a format. We need one, not simply because the Army has a format for everything else, but to provide the new commander a starting point for this important document. The sample philosophy of command presented here is a viable format that can serve as a basis for building a personalized philosophy of command. While it is certainly not meant to be the be-all and end-all of the philosophy of command, because everyone's final product will be different, it is a place to start.

Depending on which alternate definition one chooses, the word "philosophy" means "A theory of the principles underlying conduct" or "The general principles or laws of an activity." Both definitions are applicable, for they both describe different aspects of a good philosophy of command. By definition, different commanders will have different philosophies of command, because everyone's "principles underlying conduct" are different. Simply put, a good philosophy of command should spell out the general principles and ground rules under which you will command. A philoso-

phy of command is NOT a policy, and it is not communicated in a policy letter. Policies are more specific and narrower in scope. A policy spells out how the unit will conduct itself in a certain situation. The philosophy of command is a quantification of how the commander thinks and what is important to him, and it constitutes a foundation on which to build a successful company.

The philosophy of command should have four distinct parts, arranged in a standard memo format. The first part is the purpose. This area should be short and to the point — one or two sentences at the most. The most important thing is that the purpose tell the reader that what he is about to read is the set of ground rules that his new commander will work under.

The second section is an introduction. In this part, the author should introduce himself as the new commander of the unit. This is the best place to put some remarks about teamwork, the reputation of the unit, and other tone-setting comments that are aimed at the entire unit. Most important, however, the introduction lets every one know who you are. It attempts to establish a rapport that you build on in the next two sections.

The third section is the body, and constitutes the real meat of the philosophy of command. In this section, the new commander spells out those things which are important to him and establishes ground rules for the unit. Obviously, there is not school solution, and this section will reflect the personality of the commander. In the course of creating this section, the new commander should ask himself some hard questions. What is important to me? How do I handle authority and subordination? What are some things I simply won't tolerate, and some things I want to encourage? And how will power and authority flow in my unit? These should be some of the issues that are covered in a good philosophy of command. In short, try to

identify the issues that define how you will operate as a commander, and describe them for your new subordinates as succinctly as possible.

The last section should be the conclusion. No more than a paragraph long, it should recap many of the things you said in your introduction. In particular, the new commander might want to address things like teamwork, some of the challenges

ahead or his pleasure at being assigned to the unit.

In building the philosophy of command, a new commander should remember a few overall concerns. First, keep it short. A good philosophy of command should be no more than two or three pages long. Keeping it short and easily digestible ensures that it will be read by more members of the unit. It is tempting to expound on many subjects and try to pass on all

DEPARTMENT OF THE ARMY
ALPHA COMPANY, 4TH BATTALION, 68TH ARMOR
FORT CARSON, COLORADO 80913

1 January 199X

MEMORANDUM FOR ALL PERSONNEL IN ALPHA COMPANY, 4-68
ARMOR

SUBJECT: Philosophy of Command

1. PURPOSE. To describe the Philosophy of Command under which I will operate.

2. As I took command of this great unit today, I felt both proud to be given the opportunity to command and lucky to serve with all of you. As your new commander, there will be many things for me to learn and see in the coming months. By the same token, you will want to learn about me and how I operate. In this Philosophy of Command, I will lay out some of the things that are important to me, and will define how I will conduct business during my Command. I believe it is critical that we all get started on the same sheet of music, and this is the best way to go about it. In the coming months, we will face many challenges together. Your reputation is the best, and I have no doubt that by working together, we can successfully accomplish anything.

3. I have divided the areas that I want to cover into two categories: Duty and Discipline. I will cover a few subjects in each, and each subject is equally important to me.

a. Duty. (Work Performance). Robert E. Lee said "Duty is the most sublime word. A man can do no more. He should never hope to do less." That quote establishes a lofty goal, but it is one that we as soldiers should strive for. Here are some things along this subject that I think are important:

1. Support the chain of command — up and down. I expect every member of the company to utilize and respect the chain of command.

2. Do the best you can all the time. No matter what the mission is, always strive to complete it correctly the first time.

3. Give a fair day's work for a fair day's pay. I expect every soldier to work at the level of their duty position and rank.

the wisdom you've collected, but an eight- or nine-page philosophy of command simply will not be read. Second, ensure that you are able to publish your philosophy of command by the end of the first week of command — preferably the very first day. The men in your unit want to know about you, and keeping them waiting will only add to their stress. Finally, remember that the philosophy of command is not a policy letter. We've

made this distinction a few times because we see this as the biggest pitfall for officers trying to put together their first philosophy of command. Too often, officers treat the philosophy of command as an opportunity to spell out specifically how the unit will operate, and cover such subjects as maintenance, sexual harassment, training, reenlistment, or education. These issues are in the realm of a unit policy, and should be covered in the set

of policy letters that the commander publishes soon after taking command. A proper philosophy of command is intentionally vague on specific areas of unit operation, and only addresses those issues that define how the commander will operate.

The example philosophy of command that is presented here is certainly not the industry standard. As a matter of fact, the whole purpose of this article was to recognize that there is no industry standard, and to present one option toward establishing one. We believe that if these principles are followed, new commanders will be able to define the things that are important to them early on, allay the apprehensions of their subordinates, and build a basis for more successful commands. It's only a suggestion, but it's a good place to start.

b. Discipline. George Washington said that "Discipline is the soul of an Army," and I believe it. There are many facets to discipline, though, and I cover some of the most important below.

1. Never be insubordinate. No matter what the situation, respect the rank and the duty position of the leader. If a problem develops, use the chain of command.

2. Don't abuse drugs or alcohol. I will not tolerate any use of any kind of illegal nonprescribed drugs. Violators will be prosecuted to the full extent of the UCMJ. There will be no alcohol abuse tolerated.

3. Do not lie, cheat or steal. These acts will not be tolerated and will be dealt with severely.

4. Conduct yourself professionally. Every soldier's conduct should be exemplary. Sexual harassment of any kind will not be tolerated. Do not commit adultery.

4. Family. Soldiers' families are part of the Army family. A happy family leads to a productive soldier. This unit will foster active family participation in unit functions and events.

5. Leaders. Leaders lead from the front and in the front is where all leaders will be. All soldiers expect, and should receive, a knowledgeable, responsible, caring leader.

6. P.O.B. No matter what comes down, no matter what happens, no matter who was responsible, I'm the Point of Blame.

7. What I have laid out here is not meant to be the Riot Act. It is simply that set of issues and beliefs that will define how I will conduct business. If anyone has questions or comments about my Philosophy of Command, I would like to hear them. My door is always open.

Again, let me say how pleased I am to be here. It is both a privilege and an honor to serve with all of you and be a part of our unit's history. We are going to accomplish great things — not because of me, but because of us!

Irvin M. Strait
Captain, Armor
Commanding

Captain Kenneth C. Blakely was commissioned in Armor from the USMA in 1986. He held positions as platoon leader, XO, and BMO at Ft. Carson, Colo. After graduating from AOAC, he was assigned to the 1st AD in Mannheim, Germany.

Captain Harold L. Meyer Jr. was commissioned in 1984 from Iowa State University. He has served as tank platoon leader, scout platoon leader, assistant battalion S3 and armor observer controller at the JRTC, Ft. Chaffee, Ark. He commanded B Trp, 2/12 Cavalry at Ft. Knox. He worked as the asst. regt. S3, 12th Cav, before being assigned to the 2d ID at Camp Casey, Korea.

Letters *(Continued from Page 4)*

ation members who will be in the Washington, D.C., area are cordially invited to attend this outstanding event, which will commemorate the 216th Anniversary of Armor and Cavalry. The ball will be held at the Fort Myer Officer's Club, and the guest speaker will be General Gordon R. Sullivan, Army Chief of Staff. The theme is Commemorating World War II, a continuation of last year's theme. For more information, please contact CPT "Sky" DeCamp at (703)325-7972.

FRED W. GREENE III
Vice President
Creighton W. Abrams Chapter
Washington, D.C.

"Women in the Cavalry" Was Tainted by Biases

Dear Sir:

I have several observations to make about Captain Kelly John Ward's article about "Women in the Cavalry," in the November-December 1992 issue of *ARMOR*. Overall, it was a thought-stimulating piece but, as good as it may appear on the surface, it reeks with the glaring sexual bias that is so prevalent in the military and society as a whole.

Throughout the beginning of the article, reference is made to women being required to meet the same standards as men in a physical endurance test if they are to be accepted into combat arms MOSs. The sexual bias in these comments is that the standards must be met by both male and female soldiers, not just female soldiers meeting the standard of the male soldier. If an additional test is developed to screen applicants into combat arms MOSs, then the standard must be applied equally to men and women. If fairness is used in the screening, then men will fail to make the cut just as surely as women will make the cut. If the test is conducted equally and the standards are maintained, then it will be fair.

The Army already has a method of rating the physical demands of an MOS — the Physical Strength Capacity Test (MEPSCAT). The MEPSCAT has five categories; Light (lift 20 pounds), Medium (lift 50 pounds), Moderately Heavy (lift 80 pounds), Heavy (lift 100 pounds), and Very Heavy (lift greater than 100 pounds). These categories are based on Department of Labor standards. MOS 19D and 19K both have a physical demand rating of Very Heavy but MOS 88M (Motor Transport Operator) and 67U (CH-47 Helicopter Repairer) also have a rating of Very Heavy

and are open to female soldiers. There are MOSs currently closed to female soldiers with a physical demand rating of Heavy. To deny an MOS strictly on physical demand is not founded. It should be noted that the 18-series MOSs (Special Forces) have no physical demand rating because a soldier must pass a screening test to be awarded the MOS.

The second sexual bias that appears in the article stems from the point of view from which the article was written. The entire article was written from the male point of view, as a male leader having to control male soldiers when female soldiers are assigned to the unit. The truth is that as soon as combat arms is made available as an enlistment and reenlistment option for women, not only will there be female drivers, loaders, and gunners, but there will be female NCOs reenlisting into squad leader and section sergeant positions and female officers selecting Armor as their branch of assignment. The leadership challenge will not be male leaders dealing with female soldiers but female leaders dealing with male soldiers in a previously all-male MOS.

Women in the Army is a fact of life; expansion of their role in the military is just simply a matter of time. They may not be granted access to combat arms, but they will be allowed greater access to those MOSs that make up the support slice of maneuver battalions. Women will appear in the forward edge of the battle in greater numbers. They will be subject not only to indirect fire but to direct fire in their newly found positions. The immediate leadership challenge for Armor leaders will be from combat support and service units, not whether or not female soldiers will be assigned to Armor units.

The third bias that appears is the reference that women in combat arms will cause a degradation of the Army's combat readiness and the nation's security. Captain Ward's fear of mixing male and female soldiers together in a cohesive unit must be the "unimaginable turmoil" that he refers. What have all the combat support and service support units gone through all this time with male and female soldiers of all ranks working, mixing, and interacting with each other? Even the comment about the "relative youth and immaturity found in the Army" is not a defense. Youth and immaturity are synonymous. I challenge that no soldier, regardless of rank, enters the Army with anything but youth and immaturity. This is a strength, not a weakness, because these traits accompany enthusiasm and the willingness to learn. Maturity is a life-long process, and some never find it. This turmoil and youthfulness has not kept co-ed units from receiving Trained ratings

during external evaluations, has not stopped the support we as combat arms units receive on a daily basis, and has not affected the C1 status being reported each month by hundreds of co-ed units throughout the Army. Our nation's security is based on all units in the Army being able to function to MTP standards, not just the all-male combat arms units.

If female soldiers are to be denied access to combat arms MOSs, then better reasons need to be presented. Physical strength and unit turmoil cannot be used as legitimate reasons. If male soldiers in the Army today are not acting toward female soldiers with the proper bearing, professionalism, and common courtesy they deserve — not because they're women, but because they are soldiers — it is because leaders are not enforcing the policies, regulations, and ethical codes of behavior that are supposed to control our actions.

The roof of squadron headquarters will not collapse when the first Cavalry person walks through the front door. It will happen, not tomorrow, not next year, but it will eventually happen. In the meantime, Armor leaders need to work on the sexual bias that exists today. That alone will ease the transition.

GARY J. ROST
SFC, Cavalry Scout
2-4 Cavalry, 24th ID(M)
Ft. Stewart, Ga.

"A Leadership Challenge..."

Dear Sir:

Congratulations to Captain John Kelly Ward for his article, "Women in Armor and Cavalry."

Captain Ward is right. It will be a leadership challenge of the highest order. It is fine to do an article on the "what if" side of this policy. However, my feeling is that we should continue to resist this notion as best we can.

It is my feeling that the small unit commander at battalion level and below has quite enough to do in battle without the additional concerns that the admission of women into the direct combat role will certainly generate.

Today, we have (I am told by reliable people) the finest Army since the end of World War II. Why not keep it that way by not succumbing to political pressure which comes mostly from folks who have not done any fighting.

GEORGE S. PATTON
MG, USA, Retired
South Hamilton, Mass.

The U.S. Military: What Kind of Future?

The Art of War in the Age of Peace. U.S. Military Posture for the Post-Cold War World by Michael E. O'Hanlon. Praeger Publishers, Westport, Conn., 1992. 176 pages, \$42.95.

This is not a book for everyone. In fact, its less than 200 pages are barely a monograph for the military force planner specialist. Despite the somewhat pretentious title, however, the author succeeds in clearly outlining alternative force structures for the post-Cold War U.S. military. The period discussed ranges from the heady Reagan days, through the current "build down," to a recommended force level at the end of the decade. Mr. O'Hanlon, a GAO arms control analyst, recommends levels well below the "base force" of current wisdom. He calls for major reductions during the period for Navy ships (600 to 325), Marine brigades (12 to 6), Air Force tactical wings (40 to 18), and Army divisions (28 to 14, of which 10 are active). Nuclear forces are slashed to "small strike" levels for "counterforce or show-of-resolve purposes."

These force levels are determined from an assumed set of missions, threats, and U.S. global interests using some questionable measures of force capabilities. For example, Army readers might be interested to know that with a U.S. armored division capabilities score of 1.0, comparative divisions are: U.S. mechanized = 0.8, Russian T80/72/64 armored = 0.6, U.S. light/airborne/air assault = 0.1, and Russian airborne = 0.2. With other scattered comparative measures, such as airlift utilization rates and ship rotation factors, the author confronts the major obstacle in force development — quantifying effectiveness levels that military history tells us varies widely with the situational factors of leadership, training, morale, and the employment area. Would any force analyst have predicted the DESERT STORM loss ratios from the forces engaged or, even today, how many would agree with MG Barry McCaffrey's statement that the U.S. could have won with Iraqi equipment?

Despite the apparent science, nearly every force element recommended falls to 50 percent of previous levels, indicating a balance in Cold War forces that most soldiers do not accept. The successful defense of western Europe during the Cold

War had more to do with nuclear policy than any rational analysis of forces on the ground. The answer this author gives to the timeless question of "How much is enough?" seems to flow more from the strategic assumptions made than from the calculations. With no Soviet or major European conflict postulated, few Third World conflicts affecting U.S. interests, and the Nixon 1½ War criterion reduced to ½ War, such cuts appear plausible. The reality of recent experience, however, where one of the largest armor battles in history occurred outside the Cold War region and context, as well as the American penchant for disarming after every conflict, give us pause. Although there were well-exercised contingency plans for a SW Asia scenario, albeit against a different enemy, it must have been a great comfort to the National Command Authority to have two highly proficient corps in Europe with little to do but train. The ability of the Seventh Corps to change theaters rapidly and lead the coalition main attack across the desert, without any warning, METL, or even NTC training, remains a remarkable achievement. That this option is not available, even with today's force level, is an important lesson for force developers not to be too "fine" — as they say in baseball.

Joint forces with flexible capabilities across the spectrum of 21st Century warfare are required. Such forces must be affordable, but balanced in terms of size, training, leadership, and modernization — not to mention insensitive to an analyst's assumptions. Still, this book serves as a useful primer for those saddled with the daunting task of force planning in a rapidly changing world.

FRANKLIN Y. HARTLINE
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Project Manager
Tank Main Armament Systems

Stuart: A History of the American Light Tank, Vol. 1, by R.P. Hunnicutt. Presidio Press, Novato, Ca., 1992. Cloth, 512 pages, \$95.00.

The prevalent fascination with armored fighting vehicles lies with the main battle tanks of the world, essentially what a previous generation would have called medium

tanks. The classification of heavy tanks has ceased to exist, and has not enjoyed much support beyond experimentation in the United States Army. (Although, the M1A1's weight would have placed it in the old heavy category.) U.S. Army light tanks, on the other hand, have an extensive developmental and production history within our mounted military heritage. They have played a pivotal, if not decisive, role in our success of arms.

Just as the Army existed before our nation was formally founded, light tanks predated the formation of the Armored Force in July 1940, armored divisions, and an Armor Branch. More telling, perhaps, is that light tank organizations served as the testbed for the development of the armored organizations and tactics that eventually won World War II.

Now, author R.P. Hunnicutt has fleshed out an already impressive line of volumes on U.S. tank development with his latest volume, *Stuart: A History of the American Light Tank, Vol. 1*, which should prove to be the definitive laydown of light tank evolution. The book's timing, coming when we are decisively engaged in restructuring the Army from a forward-deployed heavy force to a lighter, more deployable CONUS-based contingency force, helps us focus on the role lighter AFVs have played and reminds us of their utility and the lessons learned over more than 70 years of their development.

The presentation of this hefty volume is the same as Hunnicutt's previous volumes on the Sherman, Patton, Pershing, Abrams, and heavy tanks. It is lavishly illustrated with hundreds of black and white photographs, 29 sets of excellent scale line drawings by D.P. Dyer, technical drawings, and original tech manual illustrations, all printed on high quality glossy paper. Sandwiched between the foreword by that distinguished commander, Colonel Jimmie Leach, and the reference data section, are sections devoted to early development, specialized vehicles, and historic coverage of the tanks in action. The end of the book contains the usual short section of color photographs.

The reader must keep in mind, when wading through this treasury of material, that this is only volume 1. As such, the production vehicles discussed include the FT 17, M3 series, M5 series, M24 series, and LVT series — the amphibious tractors so

critical to the Pacific campaigns in World War II — as well as a fascinating menagerie of experimental and in-between vehicles.

As books get more expensive, this one comes with a significant price, which I contend is worth it to techno-junkies, modelers, and others who are serious students of U.S. tank development. Other folks may want to consult their local library copy.

Mr. Hunnicutt has provided us a valuable addition to his Presidio series on tank development and history. But, the euphoria one gets from holding a book of this magnitude shortly after it is published is soon displaced by the anticipation for volume 2.

PATRICK J. COONEY
LTC, Armor
Quarry Heights, Panama

George Washington's War: The Saga of the American Revolution by Robert Leckie. Harper Collins Publishers, N.Y., 1992. 688 pages, \$35.00.

Over two hundred years since Cornwallis surrendered his army to Washington at Yorktown, the American Revolution continues to fascinate us. The war completely consumed the young nation and, until the Civil War, was the central event in the history of the republic. In *George Washington's War*, Robert Leckie makes a significant contribution to the growing historiography of this conflict, and in so doing, adds an exciting addition to his history of the United States.

Just as he did with World War II in *Delivered from Evil* and the Civil War in *None Died in Vain*, Leckie has produced one of the most readable single-volume histories of the war yet written. Beginning with the fall of Quebec in 1759, and followed by a succinct analysis of the cultural and political heritage of the American colonists, the author traces the roots of revolution to the removal of the Canadian menace to the north once France was defeated in the French and Indian War, and the mercantilist theory that he terms "the evil mother of this brood of grievances that were so irritating to the proud American soul."

What makes Leckie's account of the war so interesting is his anecdotal narrative of the war's chief protagonists and major battles. At Bunker Hill, for example, the author charges that the American defeat was due more to the cowardly behavior of some of the defenders (20 "volunteers" escorted a single wounded man to the rear) than to shortage of ammunition. Benedict Arnold and Nathanael Greene emerge from these pages as the ablest American generals of the war. The author also narrates the perfidy of Charles Lee, whose dereliction of

duty lost the Battle of Monmouth Court-house, and whose treasonous behavior, proposing a plan for a quick victory over the Americans to his British captors, was every bit as dark as Arnold's at West Point.

Leckie reserves his greatest praise for Washington. On his shoulders, and his alone, rested the success or failure of the American Revolution. Having been bested repeatedly by British General William Howe in New York and Pennsylvania, Washington rallied the revolution with twin victories at Trenton and Princeton. At Monmouth, he led a rejuvenated army to near victory over Clinton, and at Yorktown, he masterminded the finest joint-combined operation of the war. In America, the man and the hour had met, according to the author; in Britain, there was no man, and the hour was already past.

The major weakness of *George Washington's War* is the absence of endnotes. Nor does the author list any primary source material in his selected bibliography. Despite these shortcomings, *George Washington's War* is popular history at its best. Writing more for the history buff than the serious scholar, Leckie has once again made a major contribution to American military history.

LTC COLE C. KINGSEED
Department of History
West Point, N.Y.

Chemical Soldiers: British Gas Warfare in World War I by Donald Richter, University Press of Kansas, Lawrence, Kansas, 1992, 282 pages, \$35.00.

Most soldiers would prefer not think about chemical warfare, but armies unprepared for it can suffer. Richter's book chronicles the formation of Britain's first chemical warfare unit and its performance against Germany in World War I. *Chemical Soldiers* on one level, reads like a straightforward unit history. Yet on another, it serves as an example of the difficulties of successfully introducing technological developments into a tradition-bound army.

The book opens with a short history of the German decision to use chemical weapons and the surprise effect it had on the first units attacked. Gas made normal breathing painful, damaging, and frequently fatal. It induced panic until immediate countermeasures were developed and used.

The British responded by developing improved countermeasures and employed gas against the Germans. What they failed to recognize was the general ineffectiveness of gas once a good gas mask was developed. The popular call was for re-

venge against the Huns. A new unit would be formed to carry the gas war to the Germans.

A special unit was established in the Royal Engineers (RE) under the command of a regular officer, Charles Howard Foulkes. Foulkes was the driving force to create a British gas warfare capability. The unit was manned by asking college-graduate chemists to enlist or transfer to the unit. Uniquely, all enlisted men below the rank of sergeant were corporals, drawing more than twice the pay of privates, and all were armed with revolvers. This unusual grade structure and armament caused problems when the initial battalion was deployed. After the unit was expanded to brigade size, privates with rifles formed the bulk of the manpower.

The attempt to man the unit with chemists turned out to be unnecessary, but through the war the majority of the unit were chemists. The unit would have been better served if most men had been plumbers or pipefitters. The primary method the Special Brigade, RE used to disseminate gas was to bury four gas cylinders, (exactly the same as seen in any welding shop) in front of the trenches, couple them together, and then open the valves on schedule. This allowed a cloud of gas to form and drift over enemy lines.

Richter describes the work required to move the cylinders, with labor drafted from infantry units, along with the problems of moving cylinders through muddy trenches and then emplacing them. An alternate method was to have cylinders on light rail cars behind the trenches and, on schedule, release the gas. All this required favorable winds, which normally did not cooperate. The overall verdict of these attacks is that they were a waste of manpower and materials.

Luckily, another unit officer, William Howard Livens, developed several alternative ways to employ chemicals. The most successful method was the Livens projector, a high capacity, short range mortar. The effect of the Livens projectors was always localized, but they sometimes facilitated infantry attacks. It is noteworthy that the Special Brigade never used mustard gas as it was deemed too dangerous to the employers to use against the Germans.

The book outlines the difficulty of attempting to employ a new technology during war when there is no doctrine, tactics, or established organizational pattern to follow. The need to select a credible spokesman as the commander of the effort was driven home in the book. Richter makes very effective use of contemporary accounts of people exposed to gas and those who used it to express how most felt about using chemical agents. He described one unusual

countermeasure against clouds of gas. The Germans prepared small fire points and after seeing an oncoming gas cloud, would light the fires across a broad front. The gas encountered the hot air from the fires and ascended over the trenches.

The effectiveness of Foulkes as a leader in developing strong unit cohesion was exemplified with the formation of clubs that held reunions and published unit newsletters after the war. These reunions lasted until 1977, when the number of survivors had declined to the point that it was not practical any longer.

Despite the hardships the men endured, and the high cost of providing the material to the unit, in the end gas proved to not be decisive on the outcome of the war. The book is a must-read for any officer or NCO who must train people to use protective equipment properly. Anyone involved in R&D who is responsible for developing a new technology should read this book as a lesson learned on how to field a new technology, and a caution to not deploy the technology before all the consequences are clearly understood.

GERALD A. HALBERT
CPT, RA (Retired)
Earlsville, Va.

Stonewall: A Biography of General Thomas J. Jackson by Byron Farwell, W.W. Norton, New York, 1992. 560 pages. \$29.95.

This revisionist biography of Jackson's career will prove as controversial as Alan Nolan's recent challenge to Robert E. Lee's place in America's pantheon of military heroes. Farwell argues that while Thomas J. Jackson was a good man and a great military leader, he had serious faults, and had risen to his highest level of usefulness to the Confederate cause when he died. The author repeatedly cites Jackson's abrasive personality and his penchant for secrecy as proof of his assertion that Jackson reached a career culmination point as a corps commander. An interesting supporting argument is Farwell's repeated contention of Jackson's total inability to function without adequate sleep.

Stonewall is well written, highly readable, filled with interesting anecdotes, and for the most part very accurate. Farwell analyzes circumstances that fully reveal the negative side of Jackson's character, ones passed over by previous biographers such as G.F.R. Henderson and Frank Vandiver, thereby achieving his intent of presenting a balanced account. The book's weaknesses and errors vary from minor to substantial. The author identifies a famous photo of

Confederate dead as being from the battle of Fredericksburg in 1862, when it is actually a picture of the 18th Mississippi's dead after the fighting there on 3 May 1863. The author's assertion that decisive victory lay within the Confederates' grasp had they only mounted a pursuit after First Manassas minimizes the extent of Confederate disorganization, and ignores the organized reserve of 5,000 men that Irvin McDowell had in Centreville.

Farwell's stressing the negative impact of sleep deprivation on a commander's decision process has a timeless utility — even hundred-hour wars require sleep plans. Lack of source notation lends reader friendliness to the book but limits its utility for scholarly use in the advanced courses and Staff College.

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U.S. Military Academy
West Point, N.Y.

This Kind of War, A Study in Unpreparedness by T.R. Fehrenbach, Bantam Books, New York, 1991. 684 pages, (paperback) \$5.95.

The Department of Defense faces an uncertain future. Our budget will undoubtedly be cut. There will be discussions of roles and missions. Homosexuals may be allowed to openly join our ranks. Force cuts and RIFs will disrupt the force. In light of these uncertainties, every officer and soldier needs to look to our past to find the real meaning of the Army. We learn more by looking at defeats.

The Chief of Staff's rallying cry is, "No more Task Force Smiths!" The best book I have ever read that tells the lessons of that ill-fated task force, and the results of losing faith with the real purpose of the service, is Fehrenbach's *This Kind of War*. It is time to read and review this book again.

Communism, and the expansion of North Korean communism in particular, may now be more akin to Korea than even DESERT STORM. Fehrenbach points out that, at the end of World War II, there was a great desire to disarm and reduce the size of the force. The end of the Cold War brought similar cries for "peace dividends!" Before Korea, the Army and the other services decided it would be easier to not resist the pressure of social reformers and to accommodate changes to traditional military discipline and outlooks. The Army just went along with the tide of fads; simply put, we became soft. When the storm broke in Korea, the Army paid in blood before it regained its focus.

Fehrenbach describes the state of the pre-Korea Army, of special note is chapter 7, "Task Force Smith," and chapter 25, "Proud Legions." Fehrenbach describes an Army that was outgunned, outnumbered, and sadly also outfought. The result of the Army losing its focus, and being gutted by reformists and peace dividend seekers was a brutal three-year war.

Time has changed the world scene, but parallels persist. American wars in the New World Order will be wars or battles of policy. The media may preclude us from fighting three-year wars, but the wars may be no less brutal. Wars of policy, as Fehrenbach wrote, are "inevitable, since the world is seething with disaffection and revolt..." Military force alone cannot solve the problems of the world, but application of force can set the conditions for a solution. Fehrenbach describes the force needed for this kind of world, and the force has more in common with Roman legions than with minutemen.

In chapter 40, "Lessons," Fehrenbach describes the Army needed to confront communism. Substitute "New World Order" for "communism" and we have an accurate description of the meaning of the cry "No more Task Force Smiths!" Our Army must never forget that our purpose is to win America's wars and battles. We do not make policy, we achieve the goals of policy. We must not be worried about the passing internal concerns of the Republic, for we are the guardians of the Republic. Our pride must be in the Army and what we defend, the Constitution. Fehrenbach describes an Army in a state that almost caused it to lose a war. This is the kind of book to read and discuss.

The Army has a choice in the next few years. We can become consumed with internal politics and lose our focus, or we can train hard, retain our skills, and defend the Republic. The choice, in the final analysis, lies within every soldier in the Army.

Fehrenbach wrote an unflinching account of our Army's experience in Korea. The Regular Army almost failed the Republic at the beginning of the Korean War. Read this book; it is important to understand the "what" and "why" of Task Force Smith. Our call will come as the New World Order is established. If we go to Yugoslavia, Somalia, or some other region on the brink of chaos, we must be as hard as the legions and committed to the Constitution. We are morally obligated to intellectually and physically prepare for the next war. We must not fail.

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"The Namesake Series"

This portrait of General George S. Patton and the M-48 main battle tank that later bore his name is another in the new series by ARMOR Contributing Artist SPC Jody Harmon. The portraits are in color and will be available through the U.S. Armor Association.