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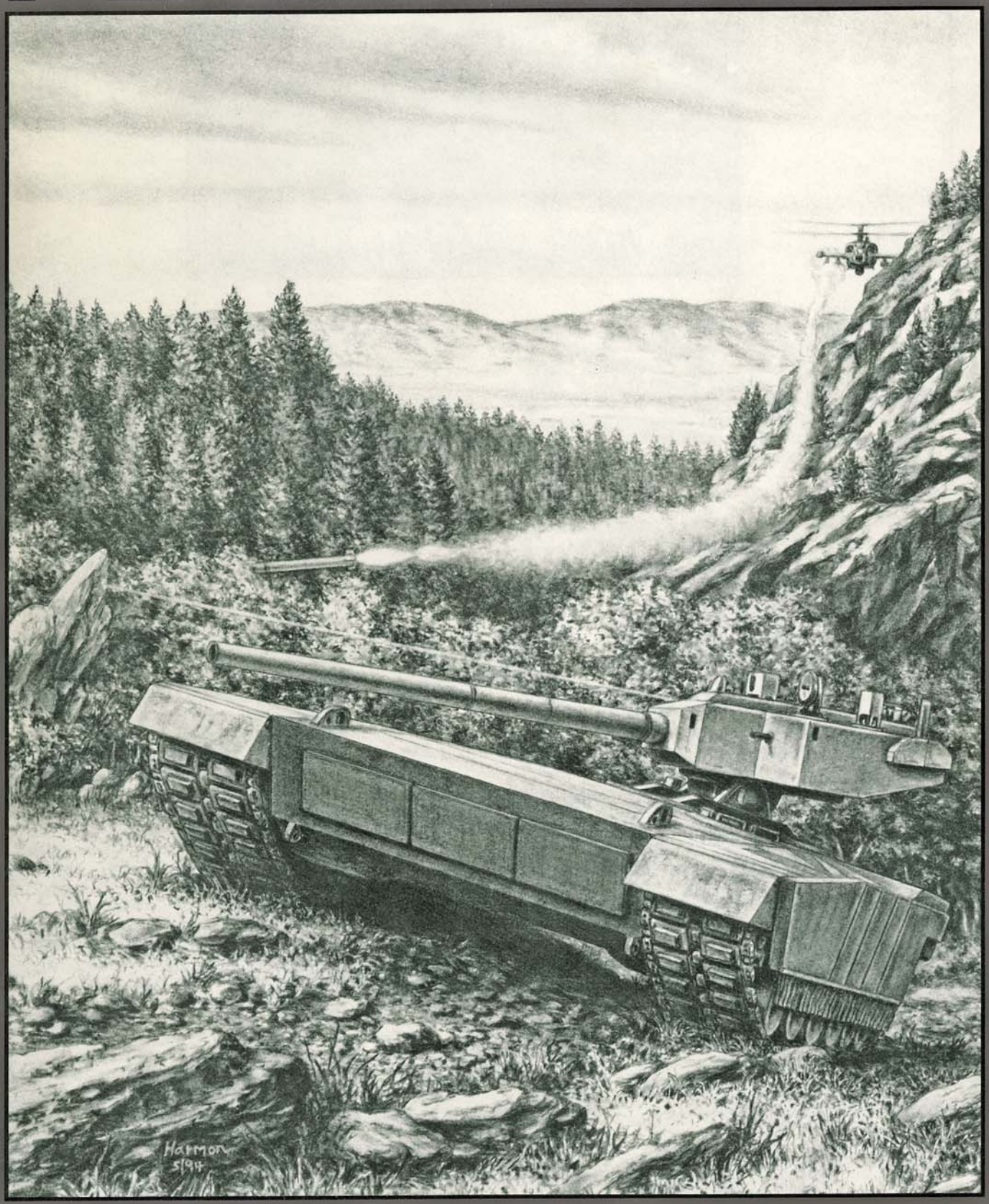


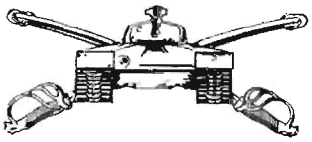
Vehicle Defense - Today, Tomorrow, and Next Year

PB 17-94-4

July-August 1994

While reading a fascinating little book, *Cavalry and Armor Heritage Series — Leadership,* prepared some years ago by the U.S. Armor Association, I found a thought-provoking passage written in July of 1888 by Major E.V. Sumner, 5th Cavalry, Brevet Lieutenant-Colonel. His words, which I reproduce below, are as appropriate to the officer and noncommissioned officer today as they were 96 years ago when he penned them.

There are as many opinions in regard to the proper way of exercising command as there are men to give commands. Some captains are best when left to exercise their own judgement in controlling their men, while others in the same command have to be followed up closely. Some, if the responsibility is thrown upon them, visit their troops and quarters frequently and have a thorough knowledge of everything pertaining to their commands, while others sign their morning reports in bed at the hands of a servant, perhaps, and seldom see their troops or only see them when compelled to do so, giving as an excuse for such neglect the opinion that men in quarters should not be too often disturbed by the presence of the officer. Such an opinion is nothing less than a mere personal convenience to the officer who holds it, and such an officer not only makes a convenience of his troop but also compels the government to spend money in his pay for which it gets a small return.... It is fascinating in the extreme to read of the brilliant charges and maneuvers of large bodies of cavalry in the field, but awfully stupid and annoying to come down to an inspection of Private So and So's underclothing. Still, it is important that the private have his clothing and it is essential that the captain know he has it, without regard to what was done at Mars-la-Tour or what was not done at St. Privat. In other words, if we expect to make any real advancement, the officers, whose duty it is to look after the instruction and improvement of the individual soldier, must be at their posts constantly for practical work; otherwise the magnificent theories set forth for our instruction will prove as useless as an idle dream and our superiors, although they may find us well up in the history of the past, may meet with disaster in our not being able to grasp and perform the simple duty required to meet a present emergency....



In peace and in garrison the officer has every advantage, has no anxiety and no fear, the daily routine of his duty goes hand and hand with his comforts and amusements, but imagine the feeling of a captain, who, brought with this troop, suddenly in the presence of an enemy, with a desperate duty to perform, having neglected his duty to his men, now feels a want of confidence in them and they in him. Under like circumstances the officer who has been true to his subordinates now commands their respect and affection as well as full obedience, and has in that sufficient strength to enable him to engage the enemy with every confidence of success.

The best and strongest of us require encouragement occasionally, and when it comes from a superior it seems to have double weight. The soldier who never gets a pleasant word or receives the benefit of a kind act from his captain will not be likely to do more than he is compelled to do and will escape that if possible. Strict justice to all, kindness to those who are trying to do well, firmness with those who try to do wrong, should be the rule.

— J.D. Brewer

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ARMOR

The Professional Development Bulletin of the Armor Branch PB-17-94-4

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LETTERS

11th Panzers Did Not Always Win the Fight

Dear Sir:

The March-April 1994 issue of *ARMOR* contains an article by Dr. A. Harding Ganz entitled "The 11th Panzers in the Defense, 1944." On page 29 of the magazine, there is a paragraph of the article which states: "Another attempt came when the U.S. 45th Infantry Division cut a highway northeast of Lyon on 31 August at Meximieux. The next day, a 111th Kampfgruppe charged through a roadblock of the 179th Infantry and into the regimental headquarters in the town. When F Co. was surrounded... To GIs who ran afoul of the 'Ghost Division,' it was no 'Champagne Campaign.' "

On 31 August-1 September 1944, I was the commanding officer of the 1st Battalion, 179th Infantry Regiment. Minus two rifle companies, B and C, we occupied Meximieux on the afternoon of the 31st, relieving the 2d Battalion which proceeded north to Chalamont. The regimental headquarters remained in Meximieux with the forward CP moving north with the 2d Battalion. F Co. was not in Meximieux as implied by the article, but on its own manning a roadblock midway between Dagneux and Meximieux.

On the afternoon of 31 August, elements of the 11th Panzer overran the considerably outnumbered F Co., capturing many of its soldiers, although subsequently 30 of the captured returned, bringing with them as PWs their former guards from the 11th Panzer.

On 1 September around 0900, the Kampfgruppe attacked Meximieux from the northeast and the south. We succeeded in repelling these attacks, but at midday, we observed six German tanks each carrying some infantry soldiers approaching the town from the southwest. I had two tank destroyers attached to my battalion and had stationed them back-to-back in the

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center of town at the main road junction prepared to deal with an enemy armor penetration from any direction or to move to a specified point on the perimeter of town, as needed.

The six German tanks did indeed penetrate. Our soldiers took care of most of the enemy riflemen riding on the tanks as the tanks swept into town. But as they approached the center of town, the TDs knocked out the first three tanks, one of which careened into the lobby of the Hotel Lion d'Or. Two of the remaining three tanks rushed by the TDs; one was knocked out by bazooka fire and the other took a direct hit on top of the turret from an 81-mm mortar round fired by D Co. It set off the ammo in the tank. The sixth tank withdrew from town.

We identified four to six additional tanks, but they remained outside of town and our artillery damaged three of them. Sporadic fighting around the perimeter continued until nightfall when the Kampfgruppe began to withdraw from the area. By daylight the next morning, Meximieux was again secure and the Kampfgruppe had failed in its mission to drive us back from our position holding the road on the flank of the retreating 19th German Army and enabling our forces to race north, maintaining pressure on them.

We had a total of 11 casualties while the Kampfgruppe suffered 85 known dead and many more wounded. We also took 41 PWs. The Kampfgruppe lost six tanks, 10 other armored vehicles destroyed or damaged by our artillery and abandoned, and four mortars and four machine guns captured. All of this was accomplished by a battalion minus two rifle companies, a couple of TDs, the clerks, cooks, and drivers of regimental headquarters, and our supporting artillery. An important element in the successful defense of Meximieux was a group of about 150 French Forces of the Interior (FFI) that joined with us in the fight and performed superbly. It was not a "Champagne Campaign" during those 24 hours, but we did prevail.

The 11th Panzer Division was certainly an outstanding division and performed with distinction in the Southern France campaign, but it did not always win the fight as we proved at Meximieux.

MICHAEL S. DAVISON
GEN, USA, Retired
Arlington, Va.

Technology Is No Substitute For Training

Dear Sir:

In the space of a few days, I have read three very current articles on the digital battlefield. The *Army Times'* "Desert Trails," the *Washington Post* article "In the Electronic Battlefield...," and *Armor's* "The Journey to Force XXI..." each talk of how digital technology will come to dominate the battlefield in the next few years. Each speak of the ease our soldiers will be able to use these new enhancements to our ability to wage war. To all this digital hype I say, cow droppings. If soldiers equipped with 1960's technology can defeat similar soldiers with 1990's technology, what could be going on to make the difference? In a word — training. The OPFOR soldier gets more training in how to fight in a month than the typical soldier gets in four. The lesson is *training one's soldiers to be the best is what counts.* Our Army has learned this lesson many times, but it seems that we are already trying to substitute technology for good, arduous training.

COL Lamar's comments about the ability of the 3d Brigade to get better are very true. However, they would not be around to learn the lessons because they would be dead in the first battle — a situation we in the Army have vowed would never happen again. The digital battlefield is coming, but it must not be at the price of training.

WILLIAM R. CRONK
Springfield, Va.

MILES Sensors for IFF Warning?

Dear Sir:

I'd like to address a subject that I haven't seen discussed since the Gulf War — the area of fratricide. I want to share an idea that should help minimize fratricide.

There has been a lot of discussion in other defense journals and magazines about using a radio frequency-based IFF system on armored vehicles. It may be a viable option, but it's not where the main effort should be.

Every military in the world has laser rangefinders ("Tank Warfare Balkan Style," Sep-Oct 93). The IFF should be triggered by a laser pulse. In addition to the IFF output signal, there should be an audible tone in the CVC helmet and turret to let you know you've just been lazed. (Most antiarmor helos use laser rangerfinders.) If I know I've been lazed, I can take evasive action (stop, move, turn, or give an alert).

There are more laser target designators coming into use everyday. If someone lays a laser designator on you (constant beam), you should hear a different tone in the CVC and turret, and the IFF would also be triggered. Again, this would allow you to take some type of evasive action. This signal should be monitored by incoming fighter-bombers, and they need to acknowledge our signal. Once we've been targeted, we need to know that they know we're there.

So, what do we need? A sensor system that triggers an IFF emitter and an internal alert signal that is set off by (a) a radio signal, (b) a pulsed laser from a rangefinder, and (c) a steady beam from a target designator.

And if we were really smart, we'd integrate the MILES system sensors into this system. This would eliminate the straps and Velcro and wiring harness. Instead, we'd use the sensors mounted on the hull, turret, and turret roof as inputs to the MILES system during training.

Can we do this? I firmly believe the Armor Center can develop this type of system and have it fielded as a work order modification in less than two years using off-the-shelf components. (Look at the Army-developed FOG-M system!) We're Armor. We can do it.

1SG GALEN D. HECHT
A Co, 3/185 Armor
40th ID (M), CAARNG

Crisis-Deployable Combined Arms Teams

Dear Sir:

Your editorial in the January-February 1994 *ARMOR* struck a responsive chord in my mind. Like most of us, I've been wondering what the future holds for the armor community. As my article, "Independent Operations" (Sep-Oct 93 issue), brought out, we're going to be split into small units for future problems. American deployments to Somalia and now, apparently Bosnia, and possibly Central Africa, have created a need for us to be able to move a light armored force...quickly. In the present political climate, we can't expect guidance from on high, nor can we expect any increase in funding for new weapons.

The old iron rule is: "You go with what you've got." In the absence of a coherent foreign policy, we're going to have to create, with the forces on hand, a feasible instrument of foreign policy to fight the hand of whoever decides to use it. We are going to have to be, like modern antiarmor warheads, self-forging weapons. America's two primary needs in the world are fuel and minerals, and we must focus on protecting them — as well as on humanitarian missions and "peacemaking."

To quote Leonid Brezhnev while talking with Siad Barre of Somalia: "We are after the energy treasure house of the Mideast and the mineral treasure house of Central and Southern Africa." Whether the threat is

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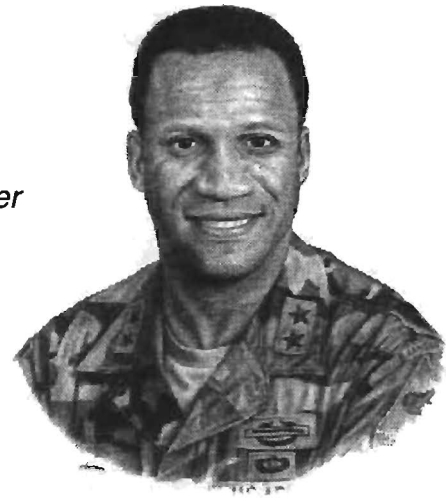
COMMANDER'S HATCH

MG Larry R. Jordan
Commanding General
U.S. Army Armor Center



Innovation and Change: Opportunities for Progress

In a previous column, I discussed the issue of branch proponency and the relationship of Armor to the mounted combined arms team. The modern Armor Force was born as a combined arms formation, with the armored divisions being composed of a "balanced team of combat arms and service units all of equal importance and equal prestige." Early pioneers saw compatibility and complementarity among branches and the concept of combined arms. The War Department directive that established the Armored Force on 10 July 1940 included among the duties of MG Chaffee, first Chief of the Armored Force, "the development of tactical and training doctrine for all units of the Armored Force" and "...development and procurement of all special transportation, armament, and equipment used primarily by armored units." The charter is remarkably similar to the one issued the Mounted Warfighting Battlespace Lab (MWBL) to "identify the needs of the Mounted Combined Arms Team, aggressively seek out solutions from across the community (warfighters, combat developers, materiel developers, trainers), and provide results which will ensure success in combat to future combined arms operations."

While the Director, MWBL does not assume all of the traditional proponency roles — personnel, individual training and professional development, doctrine, materiel requirements and development, tradition and esprit — he does serve as the integrator for the mounted combined arms team. In essence, he becomes the proponent for the Battle Dynamic of Mounted Battle Space, just as the Director of the Dismounted Battlespace Battle Lab acts as proponent for that portion of the battlefield falling under his Battle Dynamic.

Translating into practice the distinction between Branch and Battle Lab/ Battle Dynamic responsibilities could result in novel and productive approaches to combined arms training within the TRADOC school system. The established courses that provide initial entry training — officer basic course and one station unit training — are well conceived and properly sited under the branch proponent. On the other hand, training in advanced, combined arms warfighting for company grade commanders, officer advance course, may better reside under the oversight of the proponent for the respective Battle Dynamic. In their role as Battle Dynamic integrators, CG, Armor Center and CG, Infantry Center can work all relevant issues across Doctrine, Training, Leader Development, Organization, Materiel, and Soldiers as they apply to forming and fighting the combined arms team. The involvement of students representing the other Battlefield Operating Systems and Battle Dynamics further enrich the experience and enhance the focus on combined arms application. This notion might form the framework for a restructured officer advanced course for maneuver commanders that both trains a combined arms application and focuses on the particular battle space, mounted or dismounted, that applies to the student. One option might involve branch specific and technical training at respective centers and schools, followed by a joint combined arms portion for combat, combat support, and combat service support officers at one or more locations. Recent advances in Distributed Interactive Simulation, video teleconferencing, and Distributed Training open vast possibilities in terms of providing students much greater access to subject matter experts, various training resources, and diverse interactive training opportunities.

A combined arms, Maneuver Officer Advance Course should only be established if the training challenges for Force XXI can be better addressed. Change for its own sake is unproductive and disruptive. However, we should never back away from needed reform simply because the undertaking is difficult or runs counter to practice and tradition.

As we work to build and train Force XXI, the Army of the 21st Century, we must be bold, flexible, and adaptive in our approach to solving training, organizational, and doctrinal problems. Our predecessors who shaped the Armored Force that fought and won the Second World War were faced with similar challenges and opportunities. They made bold, yet necessary and correct choices in their time. Now is our time to make the necessary decisions to prepare our Army and the Mounted Force for the next century.

CSM Ronnie W. Davis
Command Sergeant Major
U.S. Army Armor Center

Promotion Potential For Master Gunners

Master Gunner. The name itself conjures up a wide range of images of what a master gunner is or should be — each unique to the soldiers that have worked with one. Whatever the opinion, the master gunner is a vital element to the Armor Force. He is the commander's advisor on tank combat tables and assists in the planning, development, and conduct of the unit's combat tables program. The master gunner has the technical knowledge and expertise to work with soldiers of any level — from the new private arriving in the unit to a corps commander.

Even with the prestige afforded a master gunner, many units across the Army are still having a difficult time convincing their noncommissioned officers that becoming a master gunner is career-enhancing. Many NCOs have seen some very successful master gunners relegated to repeated staff assignments at the expense of their leadership time. Most soldiers realize that leadership time is critical for promotion to the next higher grade. Additionally, soldiers have heard how demanding and difficult the master gunner course is, and are reluctant to volunteer to attend. Many 'potential' master gunners believe that the possibility of course failure may jeopardize their chances for promotion. These are inaccurate perceptions.

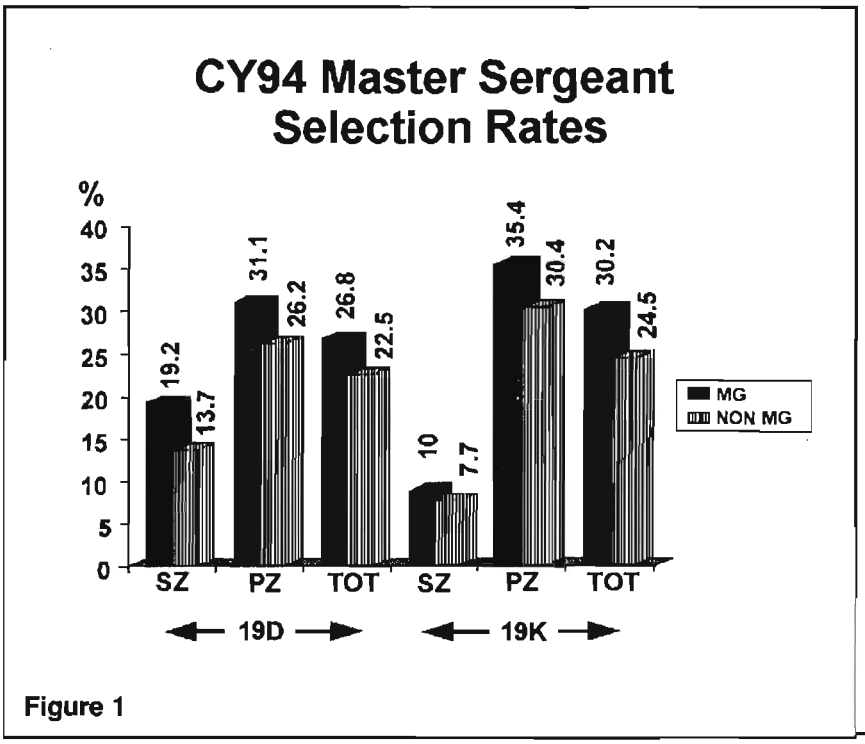


Figure 1

The Personnel Proponency Division, Office of the Chief of Armor, develops the information packet that contains the Armor promotion criteria used by the promotion board panel members. Throughout the packet, master gunner status is identified as a promotion discriminator and improves the soldier's chances of being promoted. The master gunner is considered "exceptionally qualified." Also, it states that academic failure of the Master Gunner Course should not be used as a reason to deny promotion.

But, many successful master gunners do not get promoted. Repeated master gunner assignments, no matter how outstanding the performance, will not ensure promotion. Commanders must be sensitive to the need for master gunners to rotate into key leadership positions. Key leadership assignments are critical for promotion (18-24 months minimum). Demonstrated excellence as a tank commander (for

Continued on Page 49

Vehicle Defense Today, Tomorrow, and Next Year

by Frank A. Briglia

Rapid deployability is dictating smaller, lighter future armored vehicles. This need for quick movement to a potential battle area means the Army's approach for armored vehicles needs to include improved lethality and survivability systems. This improved vehicle survivability will not be achieved by armor alone, due to the size and weight penalties associated with armor. New techniques such as the Vehicle Integrated Defense System (VIDS) will be used.

In the past, as weaponry's lethality increased, vehicles' protection levels increased by several means: thicker steel, adding reactive armor on top of armor, changing vehicle designs (to maximize the effective thickness of armor), or using advanced technology armors. All of these solutions were generally successful, but the penalties were increased size, weight, and cost.

Today's armor uses exotic steels, steel laminates, composites, and ceramics which have proven to be very effective against current threats. A good example of the effectiveness of current armor is the M1A1 tank's performance in the Gulf War. The M1A1's armor stopped Iraq's antitank weaponry from penetrating into the crew compartment nearly every time.

Advancements in the lethality of threat systems and our current defensive approach — armor — have, however, resulted in very heavy armored vehicles. The M1A1 main battle tank weighs well over 60 tons and the M1A2 main battle tank approaches 70 tons. The size and weight of U.S. armored vehicles now limits the Army's ability to rapidly transport and deploy armored systems to conflict areas, yet rapid deployment is the key to the Army's new global preparedness and fighting philosophy.

VIDS appears to be a solution to this problem of increasing vehicle weight. In simple terms, VIDS consists of three parts: threat warning systems, countermeasures, and signal processing and decision-making algorithms.

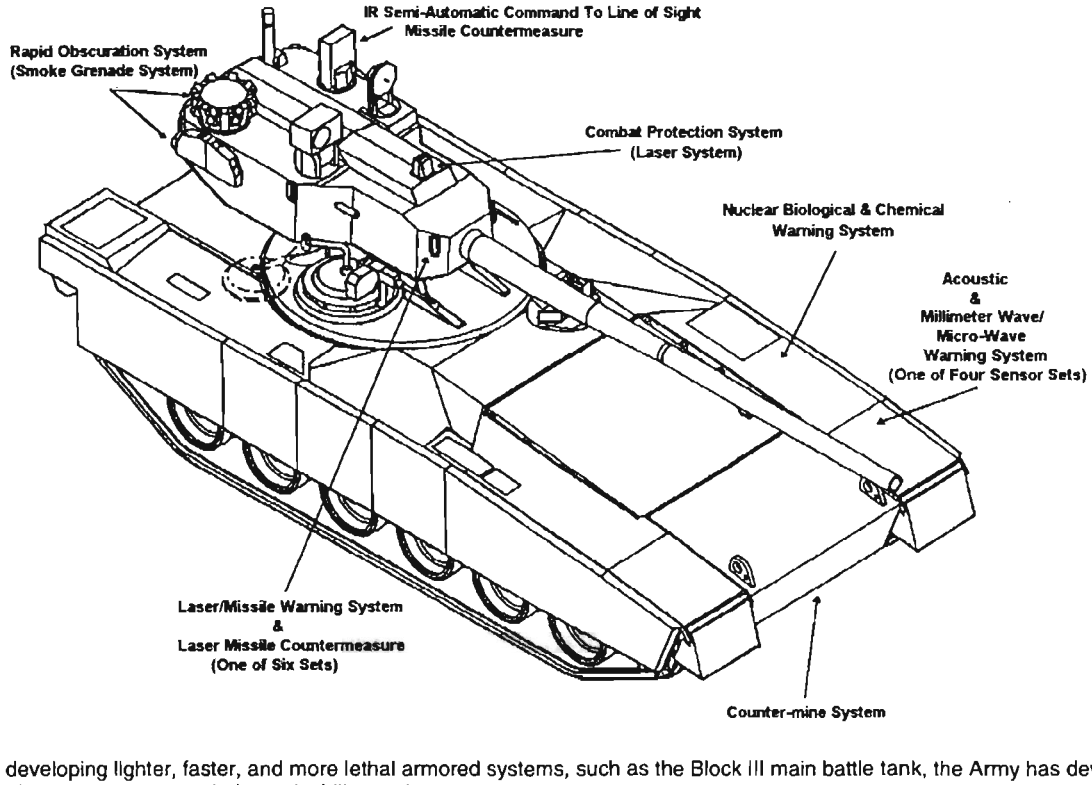


Figure 1. In developing lighter, faster, and more lethal armored systems, such as the Block III main battle tank, the Army has developed VIDS to help these systems meet their survivability goals.

Together they provide improved survivability against current and future weaponry. The benefit of VIDS over armor is that survivability is increased without significantly increasing vehicle weight.

The U.S. Government, especially the Tank Automotive Command's Research, Development and Engineering Center, has been investigating and developing VIDS and its related technologies since the early 1980s. The work began by adapting advanced survivability concepts and approaches for aircraft. The Government had developed aircraft threat warning and countermeasure systems because aircraft were vulnerable, threats were becoming more lethal, pilots were being killed, and missions were not being completed. The Army evolved these concepts to address the unique threats to armored vehicles.

Aircraft warning systems, such as missile and laser warning systems, and countermeasures such as flares, chaff, and radar jammers have proven effective in suppressing aircraft threats. Two aircraft systems the Government is considering for ground vehicles application are the AN/AVR2 Laser Detection Set by Hughes Danbury Optical Systems and the AN/AAR-47 Missile Warning System built by LORAL.

The AN/AVR2 system is composed of several laser energy receiver units (mounted around the outside of an aircraft) and a signal processing and interface unit. Each receiver unit contains multiple detectors that provide sensitivity to current laser-based threats. These receiver units also contain signal processing electronics that condition and process the signals generated by received laser energy. Each receiver unit has a fixed azimuth and elevation field of view and, when combined with the other receiver units of the system, provides 360-degree azimuth coverage and a large elevation threat warning coverage. Additional signal processing and interfacing are provided in an electronics unit. The electronics unit processes the data provided by the receiver units, determines if a laser threat is present, and ties the warning system to the aircraft electronics.

The AN/AAR-47 system is a passive electro-optical system that uses temporal pattern recognition signal processing algorithms to detect missile launches and approaching missiles. The system is composed of four receiver units (mounted around the outside of an aircraft) and a signal processing and interface unit. Each receiver unit contains spectral filters and a photomultiplier tube that provides sensitivity to energy radiated from missile launch and missile motor exhaust signatures. Each receiver unit also contains electronics that condition, process, and format the signals generated by received energy and interfaces the receiver to the central processor. Each receiver unit has a fixed azimuth and elevation field of view and, when combined with the other receiver units of the system, provides 360 degrees of azimuth coverage and a large elevation threat warning coverage. The primary signal processing and aircraft interfacing electronics are provided in the central processing unit, which determines the presence of a missile threat from data provided by the receiver units and interfaces the warning system to the aircraft electronics.

As a start to developing threat warning capabilities for armored vehicles, the Army considered applying the AN/AVR2 and AN/AAR-47 systems to ground vehicles. This was done because laser rangefinders and antitank guided missiles constitute major threats to armored vehicles. Results of similar systems application in initial field tests have shown that laser warning systems like the AN/AVR2 do provide increased survival capability against laser-based threats.

Other systems posing threats to ground vehicles include helicopter based weapon systems; radar and electro-optical target acquisition systems; nuclear, biological, and chemical (NBC) threats; mines; and semi-automatic command to line-of-sight missiles. To counter these threats, hardware has been developed that uses advanced technology and signal processing techniques. Systems developed so far include millimeter wave, acoustic, and NBC warning systems and RF jammers, smokes, flares, chaff, countermine devices, laser based countermeasure devices, and missile countermeasure devices. Systems like these must, however, be integrated to provide total combat vehicle protection. This is the philosophy behind VIDS.

Millimeter wave detection systems have been developed for use on armored vehicles to warn crews when their vehicle is being illuminated by threat millimeter wave radar systems. These millimeter wave detection systems use one or more antennas (depending on the importance of threat direction data and redundancy of hardware) to receive millimeter wave radiation and electronics units to process acquired data and interface to the host vehicle's electronics. These systems will detect some smart munitions as well as radar target acquisition systems.

Acoustic warning systems and NBC detection subsystems have also been developed and tested. Acoustic systems provide non-line-of-sight and line-of-sight detection, classification, and identification of airborne and ground vehicles to ranges exceeding those of many of the ground vehicle threats' weapon systems. These acoustic systems use four or more microphones to receive threat acoustic signatures and several microphones to acquire acoustic signatures of the host vehicle to filter out vehicle self-generated signatures. A signal processing and interface electronics unit is used to process all of the received acoustic data and to interface to the host vehicle's electronics.

Conceptual NBC warning systems have the capability to detect local nuclear and biological threats, and chemical threats both locally and at some standoff range. To date only the AN/VDR-2 Radiation Detection Indicator and Computer (RADIAC) nuclear radiation detection device and the XM22 Automatic Chemical Agent Detector Alarm (ACADA) local chemical vapor detection device have been developed and tested significantly. Several concepts have been assessed for standoff range chemical vapor detection and biological toxins detection, but hardware has not yet achieved acceptable performance.

The best RF jammers are sophisticated RF transmitting systems. These systems generate and transmit appropriate RF frequencies at power levels sufficient to enter smart munitions both directly and indirectly. Once the RF energy is inside the munition, it interacts with the munition's internal electronics, causing guidance signal disruption, electronics burnout, and/or

warhead fuze detonation. RF jammers for armored ground systems typically radiate in a specific direction rather than omni-directionally. This minimizes the input power required and keeps the jammers from damaging or jamming friendly systems.

Both Government and industry have developed smokes that absorb or block energy in the visible, infrared, and the millimeter wave bands. Smokes developed so far are predominantly effective in only one spectral band (visible, infrared, or millimeter wave), but in most cases provide some suppression capability in at least one other band. All of the armored systems smokes are dispensed by either grenade launching systems (rapid obscuration) or a smoke generating system (obscuration reinforcement). The grenade dispensing system is used when rapid smoke generation is needed (less than 3 seconds) while the smoke generation system is used when sustained smoke generation (up to 10 minutes) is needed. Some Government personnel are also examining flares, chaff, and similar systems for ground vehicles. Teledyne Brown Engineering is now maturing the obscuration reinforcement system on the Armored Systems Modernization program.

Countermine systems exist which detonate mines in front of vehicles. Several types of countermine systems could be part of VIDS, including explosive systems, electromagnetic pulse generation systems, and electromagnetic field generation systems. The first system delivers explosive material on or over a portion of the mine field. When the explosive material is in place, it is detonated, creating sufficient pressure on the mines to detonate them. The electromagnetic pulse generation systems generate a high energy pulse, which is directed toward the minefield. Energy from the pulse interacts with the fuze in the mines and causes mine detonation. The electromagnetic field generator system, known as the vehicle magnetic signature duplicator (VEMASID), generates a magnetic field in front of the vehicle that duplicates the magnetic signature of a vehicle and detonates magnetically fuzed mines a safe distance in front of the vehicle. Which of these subsystems is best is yet to be determined, but the Army has several candidates.

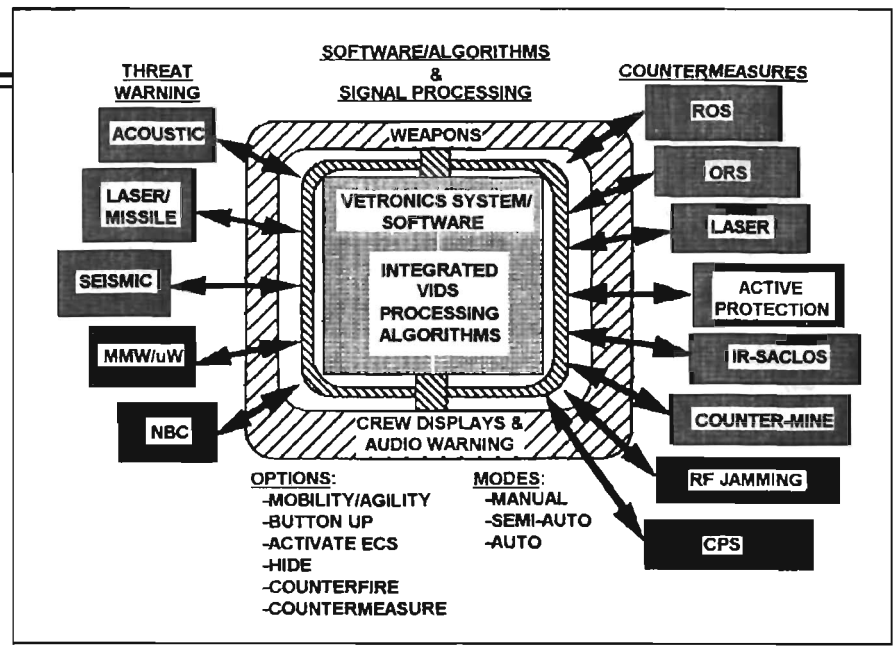


Figure 2. A revolutionary system called the Vehicle Integrated Defense System (VIDS) is emerging as an alternative to increased armor for improving the survivability of combined arms vehicles. It is a system of electronic and electro-optic threat warning subsystems and countermeasures that automatically, semi-automatically, or manually determines threatening circumstances and initiates appropriate countermeasures.

The Army is developing two laser-based devices to counter the performance of missile guidance and control units: the Combat Protection System and a False Target Generator. The Combat Protection System is an optical target acquisition and tracking system countermeasure; it uses a laser to search for, acquire, track, and suppress a threat's optical and electro-optical sights. Once a threat has been located, significant laser energy is transmitted to the threat sight. The laser energy is collected by the threat sight's optics and delivered to the operator's eye; in the case of a direct view optical sight, or to the focal plane of an electro-optical sight. The energy delivered temporarily flash blinds or permanently damages the operator's eye or the electro-optical system's detector. The threat sight can be repeatedly illuminated by the laser system to ensure effectiveness.

The False Target Generator, a laser countermeasure system applicable against missiles guided by laser designators, duplicates (or nearly so) the laser designator's signal and places a decoy spot off of, but near the vehicle. The missile cannot distinguish the difference between the laser energy on the vehicle and the decoy energy off the vehicle; therefore, the missile flies to the decoy spot or centroid of the two spots and misses the vehicle.

Missile countermeasure devices are effective against infrared semi-automatic command-to-line-of-sight missiles. These are missiles guided by a control unit that moves the missile to the gunner's aim point by tracking an infrared beacon at the rear of the missile. The missile countermeasure device emits an infrared signature like that of the missile's beacon but with greater intensity. This missile countermeasure is mounted on top of a vehicle, and, as the missile gets close to the vehicle, the countermeasure's signature captures the missile's tracker within the missile control unit. Because the countermeasure is above the center of the vehicle (the center point of a vehicle being the normal aim point of an infrared semi-automatic command-to-line-of-sight missile) the missile's control system believes the missile is flying too high and commands the missile to fly down. This continues until the missile flies into the ground.

Integrating these types of warning and countermeasure devices into armored vehicles will provide tomorrow's vehicles the capability to achieve future survivability requirements. Tests of these systems alone have shown good performance, but TACOM is taking these systems one step further toward vehicle survivability improvement. TACOM has con-

ceived and developed an approach that integrates warning systems, countermeasures, and armor. Toward this end, TACOM has supported some of the first integrated VIDS field tests. These tests were conducted at the end of FY92, were successful, and provided the first field test data supporting the potential capabilities of a VIDS.

Teledyne Brown Engineering has analyzed the capability of VIDS to enhance future armored systems survivability under the Armored Systems Modernization program. Teledyne Brown Engineering, one of Team Teledyne's members for the Armored Systems Modernization program, has worked closely with the Government to learn and understand the Government's VIDS philosophy and the capabilities of VIDS devices being developed by contractors such as LORAL, Northrop, Brunswick, Raytheon, AIL, Hughes Danbury, LTV, Alliant Tech Systems, and Arthur D. Little. In this work, two major advantages of VIDS have been noted: crew warning of an immediate threat does improve the chances of survival on the battlefield, and preplanned smart counteractions to threats are more effective than countermeasures deployed manually. The warning capability provides the notification that a threat is present while there is sufficient time to do something about the threat. The preplanned smart reaction capability removes the burden of deciding what to do from the crew so they can continue to fight and leaves the threat reaction decision process to a well thought-out logical algorithm that uses all threat and counteraction information available. This allows quicker, more informed responses to threats than a human can accomplish under intense battlefield conditions. A quick threat response decision means a quick counteraction deployment, increasing the probability of the crew's survival.

Teledyne Brown Engineering's role in supporting the VIDS development primarily involves generating data that illustrates the capability and applications of the VIDS with respect to the advanced field artillery system (AFAS), future armor resupply vehicle (FARV), combat mobility vehicle (CMV), Block III Tank, and future infantry fighting vehicle (FIFV). The primary purpose of the Armored Systems Modernization program is to perform systems and force-on-force analyses in support of the Army's development of concepts for the AFAS, FARV, Block III tank, FIFV, and CMV systems and to develop draft specifications for these systems. Other program goals include development of a systems integration lab to demonstrate integrated performance feasibility, armor research and demonstrations, signature management techniques analyses, and maturation of the ORS.

Teledyne Brown Engineering has taken advantage of the lessons learned by the Government's VIDS work and has developed a VIDS concept, for analysis purposes, that uses the VIDS subsystems to warn of a threat's presence and to counter threats, and also uses VIDS to meet the identification friend or foe (IFF) and training objectives the Army has defined for future armored systems. In Teledyne Brown Engineering's VIDS concept, VIDS is fully integrated into the vehicle system and functions in any one of three operational modes: automatic, semiautomatic, or manual. This concept fully supports the Government's idea that VIDS is not an adjunct or stand alone system, or a set of subsystems, but is integrated into the very heart of the vehicle using the vehicle control and operating system computer(s). The signal processing used to support VIDS takes advantage of the latest processing techniques to facilitate future growth opportunities. Teledyne Brown Engineering's VIDS signal processing concept prepares the digital signal processors to evolve to digital signal processing using neural networks which can evolve to hybrid digital and optical neural network processing and, finally, evolution to optical processing, if required.

An ASM survivability analysis has shown that the VIDS improves the survivability of some vehicles more so than for others. For instance, for direct fire or front line armored systems (Block III tank, CMV, FIFV), all of the VIDS warning and countermeasure systems that can be afforded (cost and vehicle burden) are needed to achieve the survivability requirements set by the Army. However, for systems not performing on the front lines, i.e. AFAS and FARV, VIDS is currently not needed as much to meet survivability requirements.

What does all this mean to future armored systems? It means the U.S. will be able to reduce the size of its armored forces and still protect the interests of the U.S. It means that armored vehicle crews will be able to fight and have a higher probability of survival. It means that as threats evolve, armored vehicles' survivability assets can evolve without suffering significant weight penalties. It means the U.S. can develop systems that weigh less than current ones and still remain survivable on the battlefield even in the presence of improved weaponry.

VIDS is only in its early stages of development, but it is proving through analyses and tests to be a viable alternative to additional armor. VIDS, in its ultimate form, will improve the survivability of future armored systems yet will be light enough to ensure that the Army can rapidly deploy its assets to any location in the world. VIDS will support a leaner and meaner armored systems concept and help reduce defense department costs. And finally, the VIDS concept will work. The Government and its contractors are making significant progress toward making the VIDS a reality and a significant contributor to the next generation of armored vehicles' survivability.

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Figure 1. Artist's conception of a Hagglunds Armored All-Terrain Carrier configured for scout use.

Light Enough to Get There, Heavy Enough to Win

by Colonel (Ret.) Charles Lehner, in collaboration with General (Ret.) Glenn Otis, Major General Ray Franklin (USMC, Ret.), and Gerald Lane, TARDEC

The Army and Marine Corps have joined a DOD effort to improve our capability to rapidly project power to regional conflicts. Advanced Vehicle Technologies Top Level Demonstrations (AVT-TLD) will demonstrate the feasibility of significantly lighter combat vehicles in an integrated series of advanced technology demonstrations. This article presents the case for articulated light armored vehicles to satisfy two requirements, for a Future Scout Vehicle (FSV) and for a a lightweight battle command vehicle.

Size, Transport, and Mobility

The Strategic Plan for Advanced Land Combat states that, "If medium and lightweight vehicles are 99 inches or less in width, they can be loaded side by side in C-17 and C-5 aircraft. In certain scenarios, transport capacity could be doubled!" The plan also highlights the importance of intratheater air transport and notes that light armored vehicle loads should be limited to eight tons with height and width restricted to 72 and 80 inches respectively, so as to be transportable in CH-47D and CH-53E helicopters. These restrictions circumscribe the limits of vehicle size for the purpose

of internal helicopter transport. Field experience teaches that conventional tracked vehicle designs that have length-to-width ratios greater than 2.0 are unwieldy, primarily when turning. If the width of a combat vehicle were limited to 80 inches, the length should normally not exceed 160 inches, about 13 feet. A conventional tracked vehicle this short would have trouble keeping up with larger tracked vehicles in rapid cross-country movements, such as the flanking movement of the VII and XVIIIth Corps around the Iraqi army in Operation DESERT STORM.

The Future Scout Vehicle will be employed with the much larger M1 tanks and the new Armored Gun System (AGS) in heavy and light armored cavalry regiments and in division cavalry squadrons. A 13-foot-long FSV will have a tough time keeping up with a 26-foot-long M1 tank because the shorter vehicle tends to pitch up and down more violently over rough terrain and has less ditch-bridging capability.

The ideal scout vehicle would fit into present and future air transport cargo bays, possess high performance and advanced mobility to run stealthily with heavy armor in high speed maneuvers over any terrain, and possess the sensors, facilities, and weapons to perform the mission.

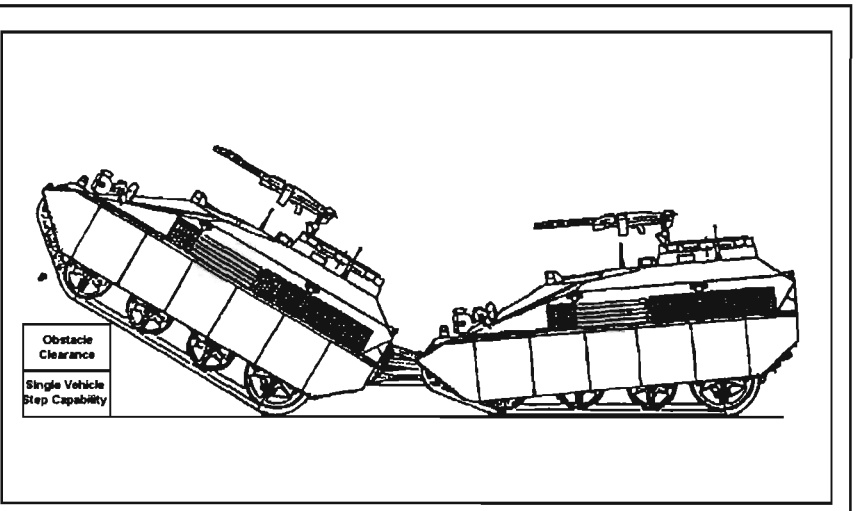

Figure 2. Articulated 6-ton German Wiesels, although a more cramped alternative to the Hagglunds carriers, would have another advantage: since both units are motorized, they could be separated during certain scout assignments, doubling the number of vehicles available. In contrast, the BV-206S rear unit is not separately powered. Articulated vehicles have a much greater obstacle clearance capability, as seen in illustration above.

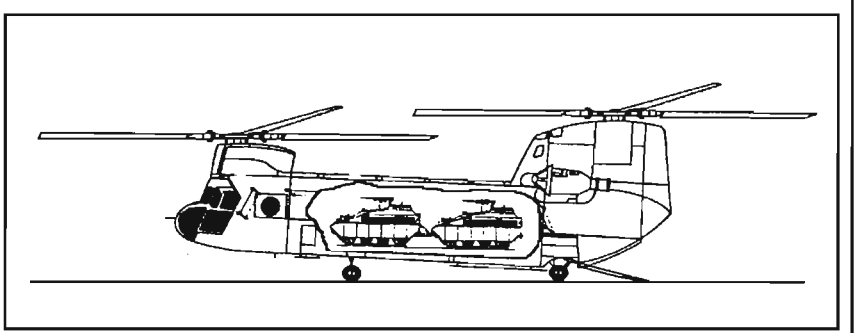

Figure 3. Both the Wiesel and the Hagglunds carrier can be carried internally in CH-47D and CH-53E cargo helicopters. The Hagglunds is a tight fit in the CH-47E.

Articulation

The connection of two vehicles with a power controlled, pitch and yaw and free roll universal joint results in an articulated vehicle. Alternatively, locking or stiffening the pitch control joint provides real mobility advantages over vehicles of much shorter length with a singular rigid structure. Fortunately, there are proven articulated vehicles which substantially reduce the violent pitching characteristic of short, lightweight vehicles. The Army owns two vehicle systems which could be adapted for advanced technology demonstrations in the AVT-TLD.

A Fielded Articulated System

In 1983, the Army initiated procurement of over 1,000 M-973 small unit support vehicles from Hagglunds, a Swedish manufacturer. Most of these M-973s are in service with the 6th Infantry Division in Alaska. Operating in grueling conditions, they are very reliable and have earned a respectable reputation for extraordinary cross-country speed and mobility. Hagglunds has designed and built a similar weight (7.7-ton) light armored version, designated the BV-206S, with a 230-hp Cummins diesel engine. The BV-206S is a worthy candidate test bed platform for the Future Scout Vehicle mobility data base. The length of this articulated vehicle is 22 feet, comparable to that of the M1 tanks and AGS with which it will operate.

The BV-206S, with a horsepower-to-weight ratio of 30, coupled with less than half the ground pressure of the M1A1, should be able to keep up with the M1 (23 hp/ton) and AGS (28 hp/ton). The width of the BV-206S is 78.7 inches and the height to the top of the armored hull is 72 inches. The BV-206S has been carried operationally inside both the CH-47D and CH-53E helicopters. The articulation advantage is evident when ramp loading. The first vehicle rolls smoothly on the interior ramp as the trailing vehicle moves up the inclined ramp.

Very Low Profile Candidate

There are other articulated vehicle candidates which could be carried in the CH-47D and CH-53E helicopters that are lighter, narrower, and have a lower profile. It is possible to articulate two small armored reconnaissance vehicles, such as the German Wiesel (See Figures 2 and 3.) The width is 72 inches and the height, to the top of the armored hull, is 56 inches. The articulated length of two Wiesels is 22.7 feet and the combat weight is slightly more than six tons. With the length about the same as the BV-206S and the horsepower-to-weight ratio of 29 hp/ton, it should have sufficient power and agility to keep up with M1A1 tanks and the AGS.

The principal difference between the BV-206S and Wiesel articulated vehi-

cles is that the two Wiesel vehicles each have an engine, while the BV-206S has an engine in the lead vehicle with a propellor shaft driving the trailing vehicle through a connecting joint. A quick-disconnecting joint has been designed for the Wiesels so that they can be easily separated, allowing the number of scout vehicles to be doubled for employment in missions like screening, where wider front coverage is needed. The Wiesel's two-engine advantage also permits equipping and operating the front vehicle as an unmanned robot (teleoperated from the rear vehicle) in very dangerous situations.

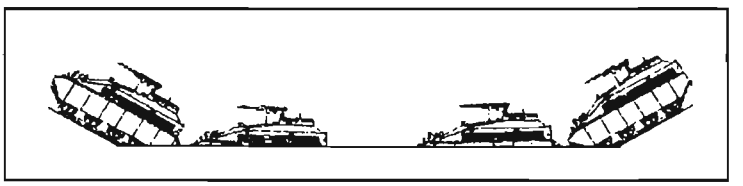

Figure 4. Articulation facilitates entering and leaving waterways.

Robotization may well be a political necessity in such dangerous situations, according to Alvin and Heidi Toffler in their recent book, *War and Anti-War*. They see a major change in the public's attitude toward "acceptable" casualty levels. According to MG Jerry Harrison, former chief of the Army's Research and Development Labs, the extremely low Allied losses in the Gulf War "set standards that surprised many people. To replicate that in future wars translates into robotics."

Articulated Test Vehicle Results

The Army and Marine Corps have conducted tests with articulated, tracked M113 APCs and M116 and M973 utility vehicles and recorded some rather amazing results:

Mobility performance tests conducted by U.S. Army Waterways Experiment Station have concluded that powered pitch control doubles an articulated vehicle's ability to negotiate rigid vertical obstacles and cross gap-type obstacles. Stevens Institute concluded that the coupled vehicles, with pitch articulation locked, could be driven 50 percent faster than the single vehicles and 200 percent faster in a limited pitch freedom mode, using the pitch cylinder as a damper. This conclusion was based on the assumption that an average absorbed power level of six watts in the vertical direction at the driver's seat was acceptable.

Summary of the Advantages of Articulation

RIDE:

- Can be driven faster cross-country than a single unit.
- Articulated steering eliminates the disadvantages associated with skid steering.
- Freedom in roll allows wheel loads to stay close to normal.
- Freedom in pitch permits the vehicle to conform to terrain profiles.
- Pitch articulation greatly improves vertical obstacle crossing ability.
- Locking the pitch cylinder increases the gap crossing ability.

SWIMABILITY:

- Ability to pitch up front vehicle facilitates entering and exiting the water.
- Articulated steering makes amphibious vehicles more maneuverable in the water.
- Increased waterline length reduces drag.

SOFT TERRAIN OPERATION:

- Lower ground pressure enables traversing snow, bogs, and soft soil.
- Ability to "duck walk" provides a means to free a nearly immobilized vehicle (especially useful in deep mud).

Future Scout Vehicle Concept Demonstration Candidates

A scout vehicle such as the Hagglunds BV-206S armored vehicle can easily carry the required crew of three, plus provide space for an additional man, such as a mortar forward observer, and still have space for a motorcycle or sensors, such as remote sentry and surveillance radar, which is organic to an Army division's military intelligence battalion. This vehicle can also mount the scout sensor suite and the required tactical radios. The articulated Wiesels shown in Figure 2 could also accommodate four men (with the maximum of three men in either the front or rear vehicle), along with a scout sensor suite and tactical radios; however, men and equipment will be somewhat more cramped, compared to the BV-206S.

The FSV is intended to be employed in both heavy and light armored cavalry regiments at corps level and in division cavalry squadrons. Cavalry scout platoons in maneuver battalions and brigades will also be equipped with FSV. Consequently, there will be significant numbers of FSVs on the battlefield. If the FSV has sufficient room to function as a battle command vehicle, it is less likely that the enemy could distinguish the command vehicle from the scout vehicle. Armored command and control vehicles and the unarmored standard integrated command post system (SICPS), which is mounted on a High Mobility Multipurpose Wheeled Vehicle (HMMWV) for light forces, are obvious "signature" vehicles and thus draw enemy fire when exposed.

Battle Command Vehicle Concept Demonstrator Candidates

Adapting some revolutionary developments in advanced avionics (smaller physical size, greater reliability, less power consumption) could convert an articulated scout vehicle into a Battle Command Vehicle (BCV). Such candidate technologies are those being developed by the Advanced Research Projects Agency (SPEAKEASY), the USAF (Integrated Communications, Navigation, Identification Architecture, or ICNIA) and the Naval Research Laboratory (Enhanced Communications Interface Terminal - ECIT). The heart of the Army airborne command and control system and the future Comanche helicopter will be the ECIT, a single unit that incorporates GPS receivers and six identical radios (each one capable of sending and receiving HF, VHF, UHF, and L-band).

ECIT will maximize information throughput and antijam capability by dynamically varying forward error correction and system bandwidth.

ECIT's packetized bus provides interface to processor modules. ECIT will meet evolving mission needs and fault recognition. The system is being developed by the Naval Research Laboratory for the Army Program Executive Officer - Aviation. An ECIT prototype was evaluated in a UH-60 helicopter and in an HMMWV at Fort Irwin during March-April 1994. If the program proceeds as scheduled, ECIT should be turned over to industry to begin production in 1996-1997.

SPEAKEASY, ICNIA and ECIT, are very versatile items of electronic equipment that may enable operation of a battle command vehicle with fewer men. In fact, the ultimate objective for ECIT development is to provide the necessary information and connectivity to permit the commander to operate in a Comanche helicopter without his usual command group. Therefore, it seems likely that an ECIT-equipped articulated vehicle could be a highly effective battle command vehicle with the commander, and only two staff officers, and a driver.

The ECIT could also provide scouts with the capability to monitor remote sensors and receive and transmit near-real-time imagery from forward scout aircraft and unmanned aerial vehicles. NRL is also working toward the 100 km range objective that LTG Paul Funk, CG III Corps, believes is an essential capability in the Future Scout Vehicle.

The abundant capability of the airborne command and control system could be duplicated in the Future Scout Vehicle. An articulated FSV the size of the BV-206S, outfitted with ECIT as a battle command variant, could carry the commander, intelligence and operations officers, a fire support coordinator, an air liaison officer and a driver, operating five work stations while on the move without an identifiable change in silhouette.

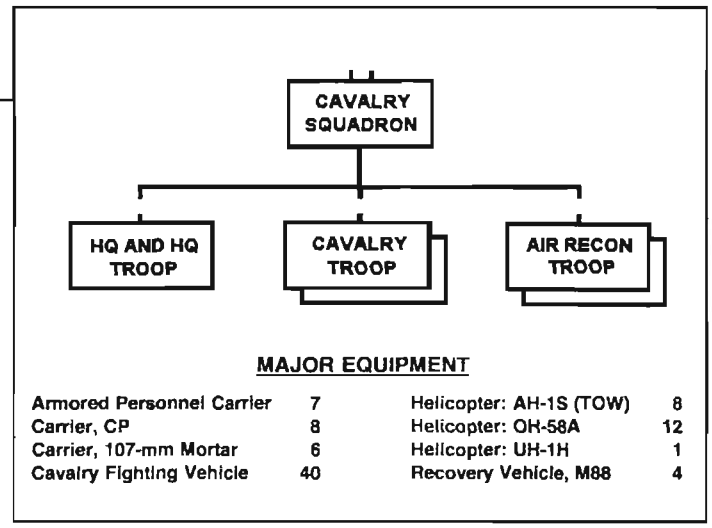

Figure 5. Division Cavalry Squadron L-Series TO&E.

Equipping the Cavalry

Some thoughts on future cavalry organizations are worth pondering in this discussion of scout and command vehicles. Squadrons in armored cavalry regiments now consist of three cavalry troops (each with two tank platoons and two scout platoons), a tank company, and a howitzer battery. In division cavalry squadrons (L-series TO&E), there are two ground cavalry troops and two air reconnaissance troops (see Figure 5). The air reconnaissance troop's OH-58C and AH-1S helicopters will ultimately be replaced with 12 Comanche helicopters. Each ground cavalry troop's three platoons consist of six M3A2 scout vehicles.

The U.S. division cavalry squadrons in Europe have been reorganized, reducing the number of M3A2 scout vehicles to five per platoon and adding three M1A1 tanks. U.S. Army Forces Command and U.S. Forces Korea are also adopting these changes in their division cavalry squadrons. When future scout vehicles are fielded, it may be logical to replace the five M3A2s with five articulated vehicles such as the BV-206S. However, if FSV is a detachable articulated vehicle such as the articulated concept shown in Figure 2, it may be possible to reduce the scout element to four vehicles because up to eight separate vehicles could be employed when required.

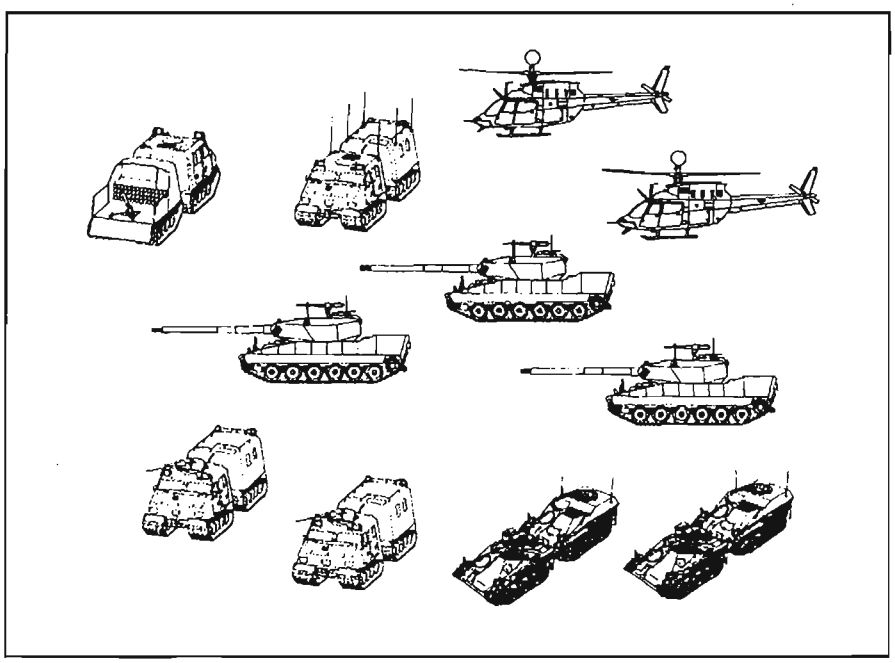

Figure 6. Proposed Advanced Concept Technology Demonstration scout platoon (reinforced).

Amphibious Employment

The evolving USMC/Navy strategic concept of Operational Maneuver From The Sea (OMFTS) in the twenty-first century requires ever greater standoff from littoral areas in order to increase battlespace, provide the fleet self-defense in depth, and increase sea room. The concept also calls for increased sea basing of air power, logistics, and surface fire support in order to remain elusive, difficult targets to find, fix

and hit. However, in order to project naval power onto the littoral land mass, light, highly mobile forces with superior situational awareness and access to on-call fires will have to be placed ashore from greater distances at sea. The light armored articulated vehicle, with its helicopter transportability and superior maneuverability is a strong candidate for the Marine Corps company to battalion strength teams of the future.

The Marine Corps has been using its Light Armored Vehicle (LAV) battalions in the role of cavalry. The cavalry mission could be enhanced using small articulated vehicles as scouts, along with infantry and mortars in LAVs. Some may argue that tracked vehicles may be difficult to maintain. Ten years' experience with the Army M973 articulated tracked vehicles indicates that the unit maintenance burden is a about the same as that of a 2½-ton truck, and significantly less than an M1 tank or amphibious tracked vehicle such as the AAV7A1.

Proposed Scout Platoon

Articulation technology is available to meet the transportability and mobility requirements of the FSV and the BCV variant with an indistinguishable, low profile vehicle. The revolution taking place in command, control, communications, computers, and intelligence systems will make it possible for the FSV to far exceed the capability of current scout vehicles. Compact and rugged electronics components will also enable an 8-ton vehicle to competitively perform with the 28-ton command and control vehicle now under development for heavy forces. Such a small, low-profile, articulated battle command vehicle will be able to get to places the 28-ton command and control vehicle may not, such as a wooded mountain top in Bosnia.

DOD, the Army, and the Marines must act now, and in concert, to demonstrate articulated vehicle concept performance in scout platoons through a joint Advanced Concept Technology Demonstration (ACTD). The ACTD should also include an Enhanced Communications Interface Terminal to determine whether the FSV could also be used as a battle command vehicle for both light and heavy forces.

A reinforced scout platoon level ACTD) should be added to the Advanced Vehicle Technologies top level demonstration plan, with tests beginning in FY 96. The test platoon should consist of two scout squads, one with the BV-206S and one with articulated Wiesel vehicles, and a section of three armored gun systems. The test platoon should be reinforced with a mortar squad and a flight of two scout helicopters. The platoon leader will operate from a command and control variant of the BV-206S, which will be equipped with ECIT (see Figure 6). The BV-206S variant should also be evaluated as a C^2 vehicle at troop, squadron, and regimental levels.

Summary

The advantages of articulated vehicles in terrain maneuver, reliability, and transportability are substantial. It is prudent and cost effective to take advantage of proven articulation and avionics technologies in hand today to provide a critical advantage in capability to tomorrow's joint forces on the move in the next littoral conflict.

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Collaborating with COL Lehner on this article were:

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Mr. Gerald Lane is the U.S. Army Tank Automotive Command's Research Development and Engineering Center (TARDEC) program manager for the advanced vehicle technology top level demonstrations. During his 18 years at TARDEC, he worked on the Armored Combat Vehicle Technology and Robotics Program.

Fundamentals of Air-Ground Integration In Division Cavalry Operations

by Captain John L. Gifford

Lieutenant General Paul E. Funk's article, "Future Thrusts" (Jan-Feb 1994 *ARMOR*), provides a wonderful introduction to the 21st century cavalry scout. However, he did not treat in any detail one of the most important elements of cavalry operations: the air cavalry. General Funk touches on the topic, stating, "When possible, air and ground cavalry should be employed together..."[1] The major premise of this paper is that in division cavalry, air and ground cavalry must be employed together in order to achieve victory on current and future battlefields.

Division cavalry is a unique battle group. It is the only battalion-level structure in the U.S. Army with organic air and ground maneuver assets. Because the air cavalry troops frequently perform the same missions over the same ground that the ground troops are assigned, techniques and procedures must be developed to facilitate smooth combined arms operations. These techniques must be trained, practiced, and refined to guarantee success.

In the 1st Squadron 4th Cavalry, (Quarterhorse), we have found that the key fundamentals of successful air-ground cavalry operations are: (1) rapid, accurate communications, (2) constant coordination between the air and ground troops throughout mission planning, and (3) aggressive execution. Following a review of the division cavalry organization and missions, this article will examine an approach to training that a unit can use to achieve proficiency in air-ground operations. Second, the paper will discuss the most essential element of coordination: communications. Third, the article will discuss integrated mission planning and execution. And, lastly, the conclusion will explore some thoughts on the future of cavalry and the structure of air-ground cavalry operations.

Organization and Missions

Presently, the Quarterhorse is organized with two ground troops, two air troops, an air maintenance troop, and a headquarters troop. (A third ground troop is expected to be added to the squadron's MTOE in FY95.) Each ground troop is equipped with nine M1A1 tanks, 13 M3 Bradley Fighting Vehicles, and two M106A2 107-mm mortar carriers. Each air troop includes four AH-1F Cobra attack helicopters and six OH-58C Kiowa scout helicopters. The ground troops, A and B, are paired with respective air troops, C and D, and work with their sister troop during all training events (see Figures 1 through 3).

The division cavalry organization provides a division commander with an optimal mix of forces for reconnaissance, security, and economy of force operations. The limitations of the air assets are offset by the capabilities of the ground forces, and vice-versa. Thus, the whole is greater than the sum of the parts.

Air cavalry assets are best suited to conducting general reconnaissance. Although it is difficult for an aeroscout to provide as much detail as his ground cavalry counterpart, the aeroscout's mobility allows him to cover a considerable amount of terrain quickly.

Conversely, ground cavalry provides the squadron commander with a significant amount of detail concerning the assigned reconnaissance objective. Because of the time required to develop detailed reconnaissance, and because ground maneuver is more restrictive, ground cavalry will be able to cover much less terrain. By pairing air and ground assets, commanders capitalize on the best capabilities of each. Thus reconnaissance can be accomplished rapidly over a large area while at the same time providing the necessary detail concerning critical areas.[2]

It is often necessary for the cavalry to fight for information on the modern battlefield. Currently, the aircraft in the division cavalry are limited in their ability to sustain an independent fight with the enemy. Of course, when M1A1 tanks from the ground troop take the brunt of the fight, the AH-1 is deadly from the flanks and rear.

Routine missions for the division cavalry squadron include zone reconnaissance, movement to contact, stationary guard, advance guard, and moving flank guard. Each of these missions requires different formations, communications nets, and task organizations for the air troop and ground troop. Every air crew and ground soldier must be familiar with how and where the troops will operate together for a given mission. For this reason, it takes time to train the troops to work together. Ad hoc task organization of air-ground organizations that have not had time to work together and develop SOPs will simply not achieve success on the battlefield.

Training

Air-ground coordination is developed over time by working with the sister element on a regular basis. This includes OPD sessions, classroom discussions, sandtable exercises, rehearsals, and FTXs. SOPs must be developed, disseminated, and practiced to enhance tactical operations.

One of the first steps our unit used was the development of squadron and troop air-ground battle drills. From squadron to platoon levels, tactics for fire and maneuver were translated into a series of drills. These rehearsed responses for actions on contact were consolidated and disseminated in a battle drill book and refined as train-

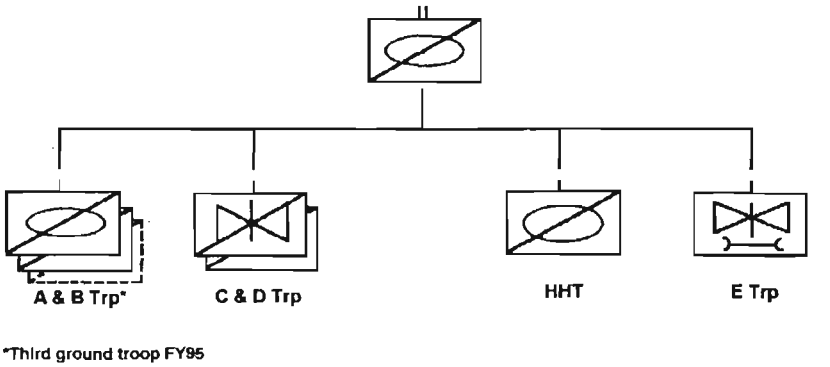

Figure 1. Squadron Organization

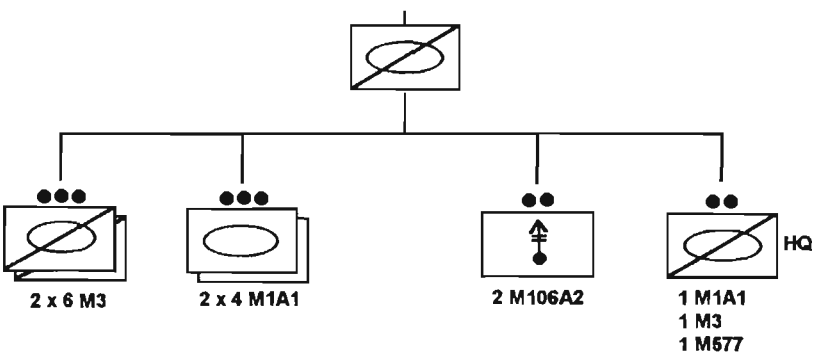

Figure 2. Ground Troop Organization

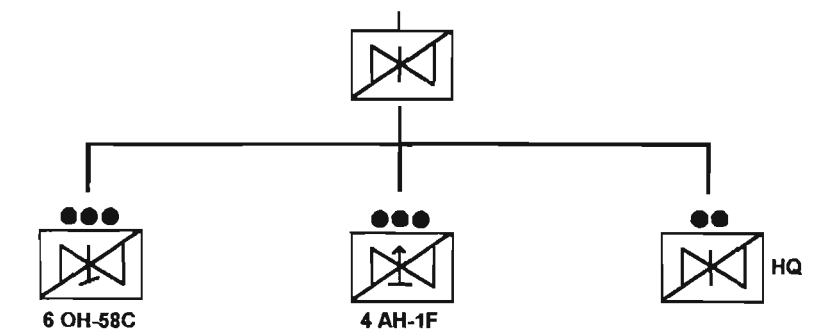

Figure 3. Air Troop Organization

ing progressed. The battle drills provided a baseline for training that created the foundation for integration of combat power at the troop and squadron levels.

Air-ground training progressed with a series of combined troop level OPD/NCOPD sessions, sandtable exercises with miniature vehicles, and walk-through rehearsals. Then, the squadron executed air-ground platoon lanes, troop lanes, and finally a squadron external evaluation using the tactics and techniques for air-ground integration that we had refined throughout the train-up. The results were positive at the National Training Center. Close integration and coordination between air and ground assets set the stage for a series of decisive victories against the OPFOR.[3]

Communications

In the Quarterhorse, we found that potentially the most important factor in air-ground coordination is an effective, redundant communications capability. Each ground platoon leader must become familiar with the pilot behind the call sign (and vice-versa) by working with him often. Radio nets must be deconflicted so that information can be rapidly passed ground-to-air, air-to-air, and air-to-ground. For each type of mission, our unit uses a specific communication net configuration. These nets are based on the OPCON status of the air troop. The limitations of the OH-58C include one secure FM net and one "red" FM net, plus a VHF and a UHF radio net. If the air troop is OPCON to the ground troop, such as in a zone reconnaissance, the air troop commander monitors the ground troop secure FM command net. The air troop commander passes information through the ground troop TOC to the squadron TOC, since he has only one secure FM net. Additionally, scout weapon team pilots monitor ground scout platoon nets in order to pass enemy information quickly. Air-to-air command and control is maintained over UHF and VHF.

Indirect fire requests are passed on the ground troop command net, or directly on the squadron fire support net. The troop FIST is shared by the air troop and the ground troop. The ground troop commander, however, is responsible for clearing all fires prior to their execution.

In an advance guard mission, the air troop commander works on the squadron command net. His air mission commander (AMC), an OH-58 lieutenant, works with the ground troop commander. In rare instances, the squadron commander will task organize the air troops into scout teams and gun teams so that he will have a Cobra reserve to attack the flank and rear of the enemy's main body, once it is identified by the scout teams. In this mission, the air troop may have only one OH-58 remaining to work with

the ground troop, and the other five aeroscouts will push as far forward as possible and work on the squadron O/I net. In most situations, air troops will rotate forward of the ground troops one troop at a time. This allows forward scout weapon teams (SWTs) to develop minor enemy situations while one air troop is held in reserve. In the latter instance, the SWTs communicate with the ground troop they are forward of on platoon nets, while the AMC stays on the troop net.

These examples are not all-inclusive and not the only way to execute the mission. The main point is that the forward aircraft in any mission must be able to relay their information to the appropriate C^2 node immediately with as few intermediaries as possible. In one setting, an aeroscout may relay information to a specific ground scout that there is an RPG team 50 meters to his north. In another, critical targets are reported by aeroscouts directly to the squadron commander on his command net. This is especially true in the early phase of operations when the aeroscouts are the first to make contact and are positioned to influence the battle with indirect fire.

In addition, there must be a redundancy of nets so that the message gets through no matter what. Ground troop executive officers play a key role in the troop TOC by gathering reports from both the air and the ground and sending them higher and lower. The troop XO assists the commander in coordinating and clearing fires. He also ensures that the air troops are updated with the current ground FLOT. The troop TOC is a crucial C^2 node. The FIST and the XO's M3 Bradley must be cross-trained to take over this mission in case the TOC is destroyed.

Mission Planning

Following the squadron operations order, the air and ground troop commanders conduct initial coordination. They review the squadron maneuver plan, develop their troop scheme of maneuver, and wargame where and how to kill the enemy. This is not time consuming, as there are standard formations and tactics for each type of mission. After a brief IPB, the two troop commanders standardize internal graphics, such as checkpoints, air maneuver corridors, and downed pilot pickup points. Responsibility for named areas of interest (NAIs) in difficult terrain will normally be given to the air troop because of its enhanced mobility. Also, the ground troop commander will specifically look for identified enemy ADA positions to assist in protecting the air troop. Throughout this planning process, the ground troop commander must keep in mind that he must be able to execute the mission with ground troops alone. A plan that cannot work without air assets must be changed, since all air operations are vulnerable to severe weather.

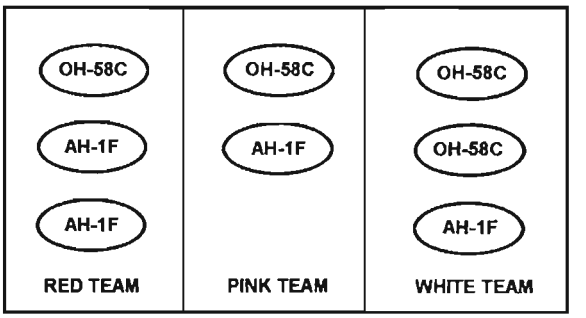

Figure 4. SWT Configurations

Formations and the current task organization for each unit must be understood by all troopers to minimize fratricide risk and maximize command and control. During this initial coordination between the troop commanders, the ground troop commander shows the air troop commander how his troop will be laid out on the ground. For instance, for a zone reconnaissance in open terrain the ground troop will normally be in a vee formation with two scout platoons abreast, mortars forward behind the scouts, and tanks center of zone in platoon wedges or in a troop wedge. It is important that the air troop commander understand and disseminate this formation to all of his pilots to ensure force identification and enhance command and control.

On the air side, the air troop commander explains his task organization in terms of pink, white, or red teams. Scout-weapons teams (SWTs) are formed with various combinations of OH-58s and AH-1s (see Figure 4). It is important to explain this task organization to all the ground troopers so that they will recognize and look for specific combinations of friendly aircraft, and be alert for enemy aircraft infiltrating friendly formations.

Communications planning is important. Commanders must study the terrain for line-of-sight and plan locations for the TOC and any necessary radio relays. An OP (ground or air) that cannot communicate what it observes is useless. Finally, visual signals must be agreed upon for flank elements, platoon leader vehicles, and the ground troop commander's vehicle. Our unit uses a combination of flags and tactical vehicle markings that are readily visible from the air. Although the tactical vehicle markings sacrifice some concealment (they are red and white, shaped differently for each troop, and approximately two feet square), their visibility from the air pays off tenfold for rapid recognition.

The initial coordination following the squadron operations order concludes by wargaming several air-ground punch drills at potential enemy locations. Each troop commander then returns to his unit to conduct troop-leading procedures. If time allows, it is extremely valuable for the ground troop commander to conduct an aerial reconnaissance of the area of operations.

The troop commander must be able to develop his operations order rapidly. After giving a troop operations order and receiving a backbrief, it is usually time to return to squadron for a rehearsal. At this rehearsal, the air and ground troop commanders compare final troop orders and note any changes. After the rehearsal, they refine coordination and make any necessary changes to their plan to ensure that it meets the squadron commander's intent. Also, any update in the enemy situation is incorporated into the plan.

The next step in the planning phase is the troop-level rehearsal. In the best case, these are joint rehearsals with vehicle commanders and pilots rehearsing together. At worst case, the air troop commander and possibly his scout and gun platoon leaders attend

the ground troop rehearsal prior to conducting their own rehearsal with the remainder of the air troop's pilots. By walking through the mission, every leader understands his role in the overall plan. Also, this reinforces the bonding of the air and ground elements by linking faces to voices normally heard on the radio. This builds teamwork and understanding between the two units.

Mission Execution

During the execution of any mission, there are several key points for coordination between air and ground. These are: during initial entry into zone or sector, awaiting LD, relief on station, and actions on contact.

As the air troop deploys into zone or sector, the ground troop is normally already established in position. The air troop commander comes up on the ground troop command net and informs the ground troop commander that he is entering the area and what vicinity he is entering at. He also informs him of any task organization changes or changes to the plan. The ground troop commander in turn updates the air troop commander with enemy intelligence, formation changes, and any special requests for reconnaissance. For instance, if contact had been gained and lost with an enemy reconnaissance element, the ground troop commander would ask the air troop commander to conduct a quick reconnaissance of the troop zone or sector as SWTs approach the area where the enemy was last seen.

Awaiting LD. If there will be a delay while awaiting LD time, the air troop commander may land for a final face-to-face coordination with the ground troop commander. This is especially useful if there is a large amount of information to pass. In some cases, the ground troop commander will fly with the air troop commander prior to a mission in order to gain a better appreciation for the terrain he is about to maneuver on. This is especially helpful on wooded or broken terrain. However, the ground troop commander should execute the mission in his tank from a vantage point on the ground where he can directly and personally influence the action.

Relief on Station. As aircraft run low on fuel or ammunition, they must conduct relief on station. Depending on the size of the sector, the air troop may maintain two pink teams forward and two in the FARP. On the ground troop command net, the air troop commander informs the ground troop that he is conducting relief on station through a checkpoint. The aircraft move along the troop boundaries to stay clear of the mortars, and pass in the vicinity of the ground checkpoint. This allows the ground elements to understand the aircraft movement overhead and helps prevent fratricide. The air-to-air coordination is conducted via UHF or VHF. This includes a sector brief that covers the friendly and enemy situation, and any FRAGOs in effect. It is important to note that positive target hand-off of enemy contact must be completed prior to an aircraft breaking station.

Actions on Contact

Early Warning. Air assets are extremely valuable for providing early warning. Normally, air scouts recon at least one phase line in front of the ground scouts. Flying Nap of the Earth (NOE), the air scouts angle of view will disclose any enemy forces in a subtle reverse slope defense prior to the ground scouts moving into the engagement area. In a zone reconnaissance, the best situation is when the air scouts determine the approximate locations of the enemy first, so that ground forces can rapidly reposition to take maximum advantage of any discovered weak points or flanks.

Indirect Fire. Aeroscouts are also very effective when used to call for indirect fire. On a security mission, the use of readily identifiable TRPs on the expected enemy avenue of approach allows the air scouts to engage with indirect fire long before the enemy is within direct fire range. This is especially true in desert environments where visibility can be as far as 50 kilometers. (Of course, the range of available artillery is a limiting factor.) With practice, air scouts are excellent at timing the call for fire with the arrival of the enemy at the TRP. Preplanned linear targets allow excellent target effect in this situation.

Indirect fires not only impede the advance of the enemy but mark his location for CAS and for ground troops. When both the air and the ground are in contact, the air makes an excellent platform for controlling the indirect fires while the ground forces concentrate on direct fires. (Ground troop commanders still clear indirect fires.) However, during a reconnaissance or offensive mission, there will be many instances where artillery will be unavailable due to conflicting priorities or lack of range. In this case, the troop mortars can range out to nearly seven kilometers with devastating effects.

Target Hand-off. Target hand-off is a crucial event during actions on contact. During reconnaissance or offensive operations, the forward momentum of the operation is maintained through effective target hand-off. This applies mainly to small enemy recon elements and dispersed enemy forces in the security belt. The aeroscout identifies the enemy force, and assists the ground scouts in locating it. In some cases the aeroscout leads the ground force to the most assailable flank of the enemy by flying NOE with the ground elements following. In close terrain, the air scouts are very effective at facilitating ground scout and tank mobility by locating trafficable covered or concealed routes, and guiding ground scouts and tanks to them if necessary.

Other options for target hand-off include dropping a smoke grenade, or using mortar WP to mark the target. If the enemy force is more substantial than a BRDM or dismounts, then the AH-1 can be employed to fix the enemy while the ground troop deploys to destroy it. During target hand-off, the aeroscout speaks directly with the closest ground scout on FM. The aeroscout can guide the ground element with his aircraft to a concealed attack route while an AH-1 fixes the enemy with rockets and 20mm.

During security operations, target hand-off adds depth to the squadron formation. Air scouts are pushed as far forward as possible. Ground scouts are arrayed in depth, with tanks positioned to destroy infiltrating enemy forces. This allows the ground scouts to report without disclosing their position. When the air scouts report incoming enemy forces, the ground

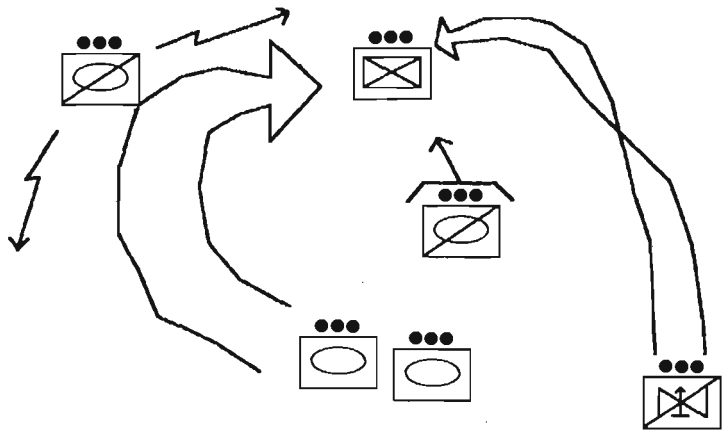

Figure 5. Troop Air-Ground Punch Drill

forces position to focus maximum firepower on the route of advance without concentrating vehicles in one location. (Vehicle dispersion helps avoid death by artillery or rocket fire.) Target hand-off from air to ground allows the air to again focus their effort on follow-on forces. In addition, air can assist if the enemy manages to slip through the ground force. A technique that the NTC OPFOR uses is to distract the ground scouts with multiple BMPs, and then push a BRDM through the screen at high speed. In this case, the air troop can move a scout or scramble an AH-1 from the FARP to intercept the "leaker" at the rear of the sector.

Punch Drills. Punch drills are battle drills designed to force the enemy to fight in two directions simultaneously. One force, normally a ground scout platoon, fixes the enemy from an attack by fire position. The troop mortars execute a hipshoot drill to place immediate suppressive indirect fire on the enemy. The other scout platoon deploys to identify enemy in depth and provide flank security for the ground punch force. The tank platoons and ground troop commander move to an assailable flank guided by the ground or air scouts and attack the enemy position violently from the flank or rear ("punch"). Simultaneously, the AH-1s attack using running fire from a different angle. The ground troop commander coordinates the timing of all forces in conjunction with the air troop commander. The scout platoon leader in the fixing force shifts the mortar fire in time for the tanks to assault safely. Ground forces are given strict limits of advance to prevent fratricide from the attack helicopters (see Figure 5). These drills must be practiced repeatedly in different types of terrain to develop the timing and understand the space considerations necessary for successful execution.

Final Thoughts

As General Funk noted, technological improvements will enhance the current organization and capabilities of the all-arms cavalry battlegroup. The introduction of the Kiowa Warrior, and eventually the Comanche, will vastly improve the digital communication, firepower, and stand-off capabilities of the air troops. Unmanned aerial vehicles will enhance the real-time intelligence gathering ability of reconnaissance forces. These capabilities must be integrated in the same manner as the future ground weapons that General Funk mentions in "Future Thrusts." All cavalry forces, and for that matter any combat organization involved in reconnaissance and security, must train and think in three dimensions in order to gain victory on the battlefield. In force projection scenarios, a light ACR or a future "rapidly deployable" division cavalry organization would provide the ideal advance guard force while the main body is in transit. Currently, regimental cavalry organizations seldom train in the manner described in this article. ACRs must adopt closer integration of the air and ground squadrons in training, or they will be at a disadvantage in combat.

In conclusion, by closely integrating air and ground assets in the division cavalry squadron, a formidable fighting force emerges. This integration is achieved through intensive training and repetitive coordination. Once SOPs are developed, they must be practiced and refined.

The key fundamental of all air-ground cavalry operations is still rapid, accurate communications. The ability to report information quickly to the correct leader sets this organization apart. In this setting, the leaders at all levels are able to make quick, informed decisions because the air and ground elements working together develop the situation rapidly. The enemy reconnaissance is stripped away through aggressive security operations, effectively blinding him. Thus, the enemy is deceived into thinking he is fighting a much larger force. Soon, the cavalry overtakes the enemy decision cycle, wins the initiative, and forces him to fight simultaneously in multiple directions. Based on our observations at the NTC, in any fluid setting, this is a fight the enemy cannot win.

Notes

[1]Funk, LTG Paul E., "Future Thrusts," *ARMOR*, January-February 1994, pp. 47-50.

[2]See FM 1-116, *Tactics, Techniques, and Procedures for the Air Cavalry/Reconnaissance Troop* for further discussion of capabilities and limitations, pp. 1-6 through 1-7.

[3]1-4 Cavalry attained success using effective air-ground integration at NTC rotation 94-02 with four separate victories against the OPFOR.

Captain John L. Gifford wrote this article while commanding B Troop, 1-4 Cavalry at Ft. Riley, Kan. He received his armor commission from the U.S. Military Academy in 1987. A graduate of AOBC, AOAC, and the Cavalry Leader's Course, he has served as a tank and scout platoon leader, and as troop XO for E Troop, 2/2 ACR during the Battle of 73 Easting. He is currently attending CAS[3] enroute to Princeton University.

SCOUT SNIPERS: One Shot, One Kill

by First Lieutenant Eric J. Teegerstrom

"All the sniper feels when he fires is the recoil of his rifle. One shot. One kill." (unknown)

These are exciting times in the world of scouts. These soldiers have traditionally represented the greatest degree of versatility in the Army. Today, this tradition continues. The deployment of the 10-vehicle scout platoon (HMMWV) to Korea has significantly increased the accuracy and amount of information the commander of the mechanized infantry, armor, or task force organized battalion receives. This is especially due to the addition of a sniper section to the MTOE. The abilities of the platoon and the information it can provide to the battalion commander is significantly enhanced by these soldiers. They provide an excellent tool for the scouts to utilize in every conventional mission. This article provides some valuable information about the sniper section and its use.

The normal MTOE for the sniper section is one E-6 11B sniper, one E-5 11B sniper, and two E-3/4 19D spotters. A sniper team, or 'Hawk Team' as it is appropriately named, consists of one sniper and one spotter. The sniper's weapon is the M24 rifle with match-grade barrel, and 3 x 10 scope. The only ammunition these weapons can use is the M118 7.62 match-grade cartridge. (The use of other ammunition on this weapon will cause damage to both the barrel and the bolt.) The sniper team also will need at least a pair of M22 binoculars or the M49 20-power observation scope, two ghillie suits, one M16A2, one M9 pistol, one manpack radio, weapons drag bag, rations, water, and PVS-7B night vision device.

The sniper's special capabilities are especially evident in screening missions. Sniper teams give the scout platoon the ability to place observation posts on key and dominant terrain that less skillful dismounted patrols would not be able to reach. Once on the site, the sniper scout can provide accurate reporting, calls for indirect fire support, or with the proper target of opportunity, his own accurate and deadly direct fire. These additional observation posts increase the 10-vehicle platoon's ability to handle a front as wide as 4 to 6 kilometers. Terrain in Korea is especially conducive to this use of the sniper teams due to the readily available high ground. The key problem that occurs with the use of sniper teams is their extraction if the enemy forces friendly units to relocate to their rear. The repositioning will place the sniper teams too deep into enemy territory to be of any great value to the commander, and generally results in their loss. The use of air assets to infiltrate and extract snipers is highly effective, but this also tips the enemy off to the sniper's approximate location.

Route reconnaissance missions present a greater challenge to both the sniper teams and their leadership. The planning and execution of the sniper missions must be planned and executed well in advance of both the battalion's movement and the scout platoon's. Commanders must keep in mind that snipers are only capable of moving 500 to 1000 meters an hour in dense terrain. If they are moving into a position or stalking, this speed is reduced even more. During the route recon mission, teams will infiltrate and develop positions where they may be used in several ways. To the scouts and the battalion, they serve as early warning of enemy activity and location, use indirect or direct fire to harass the enemy, and possibly provide some small arms cover to the scouts as they move forward. The extraction of sniper teams is more easily accomplished because the forward movement of the scout platoon and the battalion facilitate the pick up. If planning time is short, air assets are an excellent tool, but increase the possibility of detection.

In area or zone reconnaissance missions, the snipers are a valuable asset to the scouts as a local security and small arms cover. If the mission planning and execution time allows for the snipers to infiltrate the area, or when air assets are available to insert, they provide the scouts with early observation of key points, to include bridges, NAIs specified by the battalion, obstacles, likely ambush sites, or at the infamous rock drops of the Korean roadways. The scout vehicles may also deploy the teams in order to move to local key terrain for security and small arms cover. This use is very flexible and allows for quick insertion and extraction.

Another mission where snipers are a tremendous combat multiplier is the security and protection of the battalion support area or the battalion tactical operations center in the tactical assembly area. Their ability to detect and eliminate enemy snipers or counter special operations forces disrupting friendly missions is invaluable. The support units of the average tank battalion are usually stretched to their limits in their role of repairing and resupplying. The security that they can provide for themselves in the TAA is limited and they are not generally trained well enough to detect and eliminate an enemy sniper. The stalking and tracking abilities of the sniper team greatly enhance the ability of the battalion to protect its support assets in the BSA and the key leaders within the TOC. The use of snipers in counter-sniper operations reduces the requirement for regular infantry units to assume this mission within a task force.

Certain limitations come with the use of sniper teams. The sniper team cannot conduct sustained operations over an extended period. They should only be deployed as the need arises or

Using the cover of darkness to infiltrate and proper camouflage, a scout sniper team is almost undetectable even in an open area.

the enemy situation dictates. A sleep plan is essential to keep them combat effective. I have found that the sniper teams can provide excellent information during both day and night operations, as well as during inclement weather. Scout sniper teams are not designed to infiltrate for long distances deep into enemy territory; their deployment should be within the communication range of the scout platoon. This augments the scout's ability to provide early warning to the battalion and disrupt enemy activities. Communications is a limiting factor in this mission. Secure radio systems add excess weight and bulk. Smaller systems reduce bulk, but sacrifice some range and the secure mode. The secure system with a new battery may be effective over a range of 2-3 kilometers; the smaller systems are effective only within 1½ to 2 kilometers. Snipers must be trained in the construction of field expedient antennas to improve range, although this option is limited by the sniper's ability to conceal it. Exposure to the cold or heat can become a problem because of the limited supplies a sniper can carry. Movement is generally slow and deliberate. In extreme cold or wet weather, frostbite or hyperthermia are quite possible. Intense heat greatly enhances the possibility of heat exhaustion or heat stroke due to a limited water supply.

A sniper section has a psychologically demoralizing effect upon the enemy, while it provides excellent information and reduces an enemy's combat effectiveness. Currently, the only Department of the Army certified school for snipers is at Fort Benning, Georgia. The 2d Infantry Division also has an excellent course that provides snipers to the units in Korea. They accept 19Ds into this school, and the tankers have repeatedly proven themselves worthy of the task. The graduating class in July 1993 contained two 19Ds from my platoon. They were recognized by the sniper school as the top team in stalking, tracking, identifying, and engaging targets at unknown distances. One of the scouts was recognized for finishing second in the 'Top Gun' competition. Scouts are a natural for this course, and I would advocate the allotment of more slots for them.

The sniper section increases the ability of the 10-HMMWV scout platoon to perform any mission it is given. The snipers' abilities to range out and cover key terrain can put more depth and observation in screen lines. The harassment they provide, and their ability to provide early warning increase the effectiveness of scouts during route reconnaissance. Their ability to provide local security and small arms cover reduces the risk to scouts performing a point reconnaissance. The ability to detect and eliminate enemy personnel facilitates the execution of the support unit's mission in the BSA, in addition to defending key leaders in the TOC. It is important as leaders that we recognize these special skills and don't misuse them. Training programs must be developed to build their skill, and also to educate their leaders on the best methods to deploy them. Scout snipers also are an excellent asset to teach other soldiers in platoon marksmanship and use of cover, concealment, and camouflage. These specially skilled soldiers will long serve as an excellent addition to the scout community.

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Is Your Battle Staff as Blind As the Six Men of Indostan?

by Major Michael C. Cloy

The Blind Men and the Elephant

by John G. Saxe

It was six men of Indostan
To learning much inclined,
Who went to see the Elephant
(Though all of them were blind),
That each by observation
Might satisfy his mind.

The First approached the Elephant,
And happening to fall
Against his broad and sturdy side,
At once began to bawl:
"God bless me! but the Elephant
Is very like a wall!"

The Second, feeling of the tusk,
Cried, "Ho! what have we here
So very round and smooth and sharp?
To me 'tis mighty clear
This wonder of an Elephant
Is very like a spear!"

The Third approached the animal,
And happening to take
The squirming trunk within his hands,
Thus boldly up and spake:
"I see," quoth he, "the Elephant
Is very like a snake!"

The Fourth reached out his eager hand,
And felt about the knee:
"What most this wondrous beast is like
Is might plain," quoth he;
" 'Tis clear enough the Elephant
Is very like a tree."

The Fifth, who chanced to touch the ear
Said, "E'en the blindest man
Can tell what this resembles most;
Deny the fact who can,
This marvel of an Elephant
Is very like a fan!"

The Sixth no sooner had begun
About the beast to grope,
Than, seizing on the swinging tail
That fell within his scope,
"I see," quoth he, "the Elephant
Is very like a rope!"

And so these men of Indostan
Disputed loud and long,
Each in his own opinion
Exceeding stiff and strong.
Though each was partly in the right,
And all were in the wrong!

Like the blind men of Indostan, battle staffs are in the business of describing elephants. If you have ever been on a staff you can attest to the various qualities of size, smell, sound and yes, taste of many of these beasts. But, no matter the characteristics of these pachyderms, they still must be properly named, subdued, and ruled. For the battle staff the most gargantuan of these creatures can often be seen in a tactical operations center destroying the efforts of each staff member. However, unlike the elephant the blind men so poorly described, this elephant will not hold still to be portrayed. This elephant's name is synchronization.

The Elephant

FM 100-5 (1993) defines synchronization as arranging activities in time and space to mass at the decisive point. For the combat arms community, mass in most cases equates to the effects of overwhelming combat power at that decisive point. Experience from the combat training centers (CTCs) indicates that working this definition out is not as easy as describing it. Why is synchronization so difficult?

I believe synchronization is difficult because we don't train staffs in the art of visualizing the battlefield. Much like the blind men, we're not trained to visualize the elephant prior to departing from Indostan.

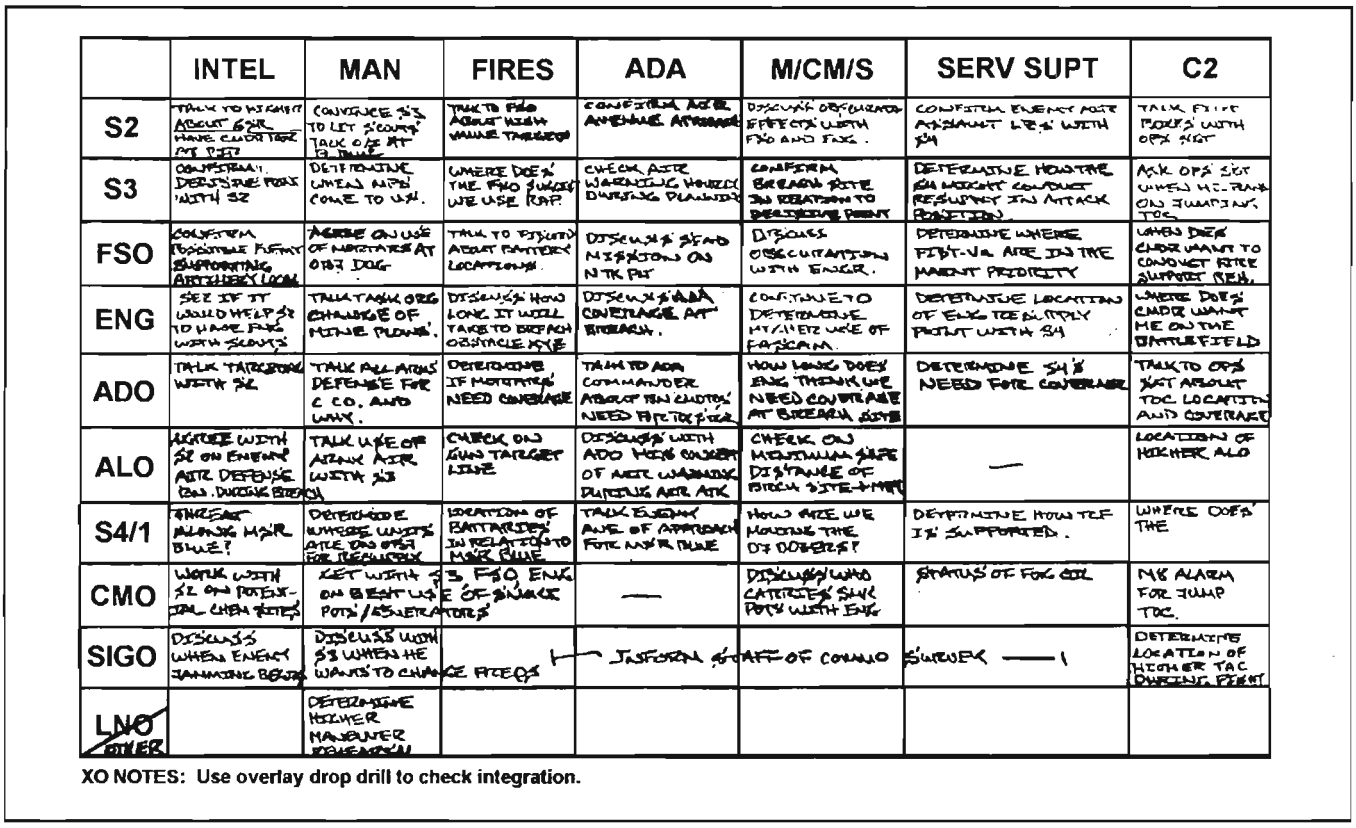
Battle staffs must be trained into an integrated fighting team. Team building requires training in the science of the military decision-making process (MDMP) that goes beyond the advance course and CAS^3. A battle staff is a team when it can visualize the battlefield through the eyes of its commander and his fellow staff members. Unfortunately, current "how-to" doctrine doesn't fully address the art of visualizing the battlefield before and during synchronization.

For example, the two primary "how-to" synchronization resources, FM 71-123, *Tactics and Techniques for the Combined Arms Heavy Forces,* and CGSC ST 100-9 (1993) do not link techniques of seeing the battlefield to the synchronization process. FM 71-123 only mentions the process of wargaming as it relates to course of action development. ST 100-9, (an ever changing nondoctrinal publication), provides a plethora of completed synchronization matrices but doesn't explain the art behind the battle staff's visualization of the battlefield. So, what is a technique that will enable a battle staff to see the battlefield and therefore synchronize better?

The battle staff battlefield visualization process, is a combination of techniques that can bridge the gap between visualizing the battlefield and synchronization. It is composed of three interrelated techniques. First, the battle staff must actually see the battlefield. Second, each member of the battle staff must understand how his fellow staff members see the battlefield. Finally, each member of the staff must see the battlefield from a three-dimensional perspective.

See The Battlefield — The Leaders' Reconnaissance

Unfortunately, leaders' reconnaissance implies just that — leaders only. Battle staffs are normally excluded because they are not considered a part of the troop-leading process. Battle staffs need to have an opportunity to depart from Indostan. Battle staffs need to see the battlefield from the commander's perspective, not only to be of better assistance to the commander but, of equal importance, to visualize how the enemy will shape the battlefield in relation to their combat function. When included in the leaders' reconnaissance, the staff is afforded the same protection as the recon force, as well as any updated visions of how the commander sees the battle unfold-



	INTEL	MAN	FIRES	ADA	M/CM/S	SERV SUPT	C2
S2							
S3							
FSO							
ENG							
ADO							
ALO							
S4/1							
CMO							
SIGO							
LNO OTHER							

XO NOTES: Use overlay drop drill to check integration.

Figure 1. Battlestaff Integration Matrix

ing. Additionally, the subordinate commanders have the battle staff in the vicinity to ask questions about their portion of the battlefield.

The battle staff must come prepared to participate in the reconnaissance. They must have their mission analysis products in hand, as well as a checklist of questions developed from these products and the commander's concept of the operation. These questions should be answered by seeing the terrain and cross-talking with other members of the staff. This should be done prior to moving back to the TOC to finalize the plan. The staff, like the leaders, must bring the necessary reconnaissance tools. These are binoculars, pickets, engineer tape and any other tools that will assist the staff's recollection when it returns to the battlefield. Adjusted maps and sketches of battlefield truth will assist the individual staff member and the battle staff as a whole to correct misconceptions and unforeseen dilemmas that two-dimensional map reconnaissance cannot capture.

The leaders' reconnaissance is the battle staff's first true concerted attempt to arrange activities in time and space to mass at a decisive point. The leaders' reconnaissance becomes the foundation for the battle staff's synchronization efforts. In order to capitalize on this vision of the battlefield each member of the battle staff must be thoroughly familiar with his combat function, as well as the effect his combat function has on his fellow battle staff members. This is better known as battle staff integration. For example, what if the blind men shared with each other their vision of the elephant to come up with a more accurate corporate perspective?

Battle Staff Integration

Battle staff integration is the executive officer's business. It is his responsibility to get the blind men to see the commander's vision of the battlefield. He cannot divorce himself from the responsibility. The operations officer or a battle captain does not have a complete picture of the unit's status and capabilities. They, and the other staff members, are too close to their combat function to be able to stand back and objectively integrate all of the combat functions represented by the battle staff. When the operations officer is allowed to substitute for the executive officer, he usually will view everything from a biased maneuver perspective, therefore distorting the efforts and the contributions of the battle staff.

The executive officer's responsibility to ensure integration of the staff is not easy. Again, each member of the staff is focused on his particular combat function and usually becomes so focused on it that he will either forget or avoid working with other members of the staff. When this happens, integration doesn't occur. At this point of the MDMP, each staff member is armed with an understanding of the unit's mission, the commander's concept of the operation, and a personal picture of the battlefield from the leaders' reconnaissance. It is the executive officer's challenge to begin piecing together each staff member's vision of the battlefield into a unified battle staff vision.

Timelines, mission analysis briefs, battle update briefs, and staff huddles help the XO to facilitate staff integration. However, they do not require the staff to commune, coordinate with, or convince each other as planning is going on.

Another technique is the use of an integration matrix (see Figure 1). An integration matrix is the XO's catalyst to help battle staff members share

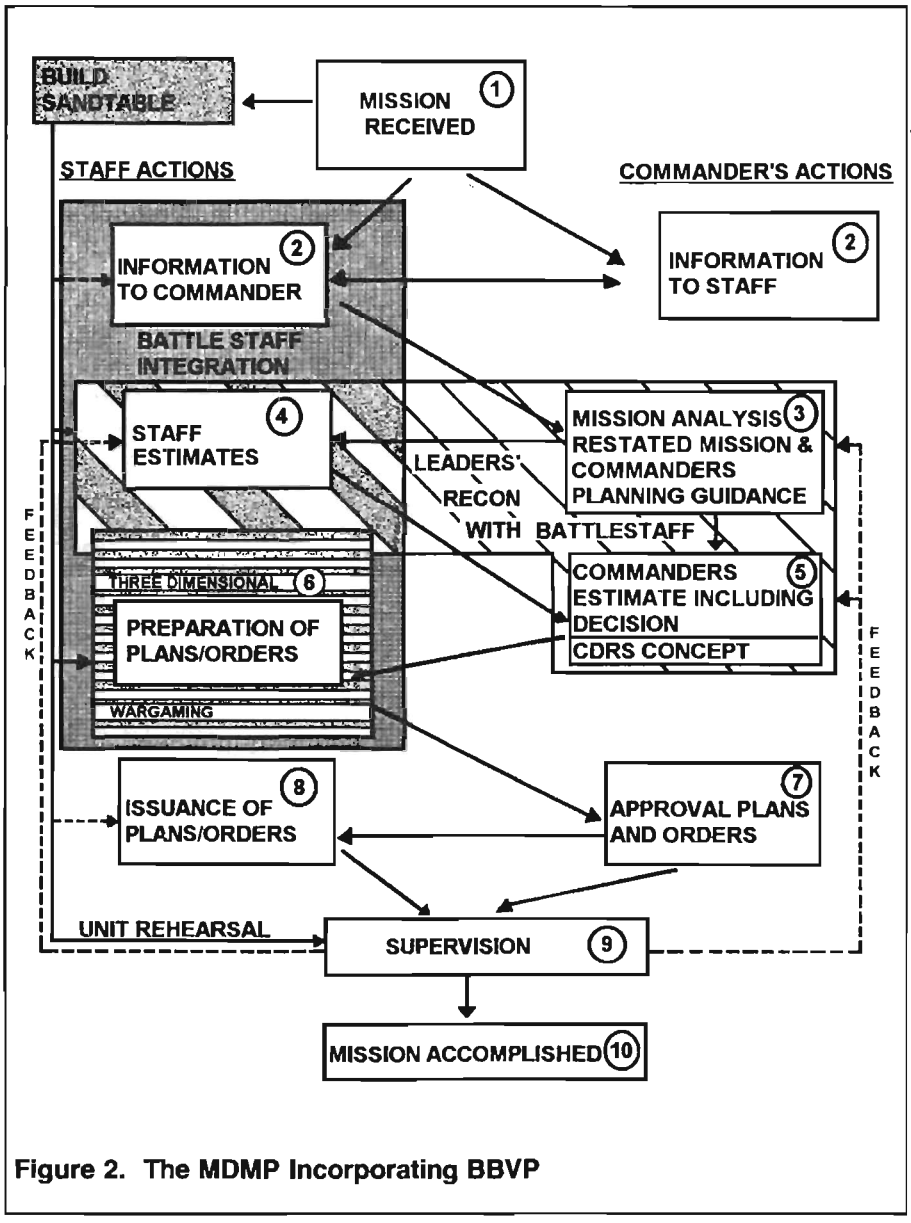


Figure 2. The MDMP Incorporating BBVP

their vision of the battlefield. It is also the executive officer's measurement tool to judge if integration is occurring. If staff integration is occurring, it will be borne out in the form of a historical record on the integration matrix.

Upon the return of the battle staff from the leaders' recon, the XO has each member of the staff brief the battle staff and him on what was discovered as it relates to his combat function. This sharing of information is the genesis for staff integration. During the brief, each staff member states what he needs to know about the combat function of the other staff members. This is recorded in the appropriate block on the matrix, whether or not it is answered during the briefing. The XO, as the manager of the integration matrix, is the only one who can check off or scratch through an information requirement or coordinating event once entered on the matrix. When the briefing is complete and estimates are being developed, any staff member can and should add any request for information or insight to the matrix as long as it relates to one or more other staff member's vision of the battlefield. Therefore, it is imperative that the matrix be posted in a central location in the TOC and under the supervision of a battle captain when the executive officer is not in the TOC.

The integration matrix becomes an indicator that staff integration is occurring. Using the matrix, the XO can bring the staff together as a whole, as a group such as the S2, FSO and engineer, (for example, to check on the completion of shared targeting information), or with an individual to ensure integration is happening. If needed, time-dependent events can be transferred to the timeline as another positive check for integration. Through training, the integration matrix will become second nature for certain types of missions and will mainly be influenced by the various types of terrain a unit could find itself fighting on.

The integration matrix is not to be confused with a synchronization matrix. Remember, we are not yet arranging activities in space and time. The staff is only gathering their personal visions of the battlefield and comparing them. From this comparison, misperceptions are corrected, requests for information is generated, and times for further coordination are made. The staff is only making the foundation they built from the recon much stronger. Again, all of this is done initially in an XO-controlled briefing and then amongst the battle staff, through the MDMP, and under his discerning eye. Once all battle staff members have shared information about their combat function and have the answers to their questions for their estimates, then the battle staff is ready to wargame the course of action from a three-dimensional perspective.

Three Dimensional Wargaming

Reading and applying the aspects of terrain to a particular series of events from a three-dimensional military map takes time and is difficult to master. Some would view it as a gift that only a few possess. The point being, that seeing the battlefield on a flat surface such as a 1:50,000 or 1:25,000 map is difficult. (Imagine the blind men attempting to describe the elephant from a piece of paper). In most cases, it is too abstract a task for the novice. Even though contour lines are superimposed on the map to give the terrain a three-dimensional effect, it takes a master's eye to understand the terrain from a 360-degree perspective. Now, add maneuver, fire support, and several other graphics and the skill is degraded even for the most astute map reader. However, remember the

definition of synchronization. The definition requires the staff to arrange activities in time and space. Therefore, the staff must understand what space is. Normally, the S2 is given the responsibility to make the rest of the staff smart on battlefield space. But he can't be everybody's critical eye, nor can he prepare the rest of the battle staff's estimates. The S2 can only lay the foundation. Each member of the battle staff is responsible for refining his products in relation to their combat function.

Lessons learned from the CTCs indicate the average battle staff has not mastered synchronization from a map. Part of the problem is the abstractness described above. Another is the difficulty of getting ten sets of eyeballs on a standard map sheet, which makes it almost impossible to wargame as a team. The end result suggest that synchronization fails because only a portion of the staff participates in the wargaming of the COA and that eventually most wargaming occurs after the plan has been issued at the unit rehearsal.

Now, why is synchronization occuring after the issuance of the OPORD? I submit that units are only doing what comes naturally. Sandtables provide that three-dimensional perspective missing when the staff attempts to wargame off what really is a two-dimensional map. What happens is that during the rehearsal, it becomes clear that the plan has some major flaws because it wasn't properly wargamed. So, commanders begin to wargame from the hip during the rehearsal. Commanders then wonder why the staff was so blind. The staff can't understand how the commanders could so easily arrange events on the battlefield. It's simple! Good commanders know what it is to live and fight in a three-dimensional world so they wargame as they will fight. (They usually are the master map readers as well.) Therefore, a sandtable makes the battlefield less abstract and more available and accessible for each member of the staff. Accurate sandtables should be used by the staff to better see the battlefield from the commander's perspective.

The use of a sandtable for wargaming brings with it some inherent problems. The first is accuracy, which has been addressed. Building the sandtable while or before the battle staff departs for the leaders' recon will allow the staff member to immediately check for accuracy and make corrections upon his return. Strict and disciplined placement of grid lines is the start of a good sandtable. The second problem is the tendency to do away with maps altogether. This should not be a problem. When wargaming, to support estimates and battle staff input, the XO should ensure his soldiers use individual and operational maps, as well as quality graphic products. He should never allow the battle staff to create an estimate from the sandtable alone. The last problem is that to use this technique requires work. The entire battle staff must be involved. The operations sergeant will be glad to lay the sandtable's foundation, but each member of the battle staff must be represented, especially when it comes time for the various graphic control measures to be emplaced.

Finally, in answer to the argument that it is impossible to do this every time, I offer a personal observation. I recall, from observing approximately 40 battalion task forces at the NTC, that almost all of them conducted a sandtable rehearsal for each mission, regardless of the circumstances of time and weather. Why would it be so hard to construct a sandtable upon the receipt of the warning order, to be used initially for the battle staff, and ultimately for the unit rehearsal? This way, as an additional benefit, the sandtable is available to the staff as a substitute if it is unable to be a part of the leaders' recon. It is just a matter of incorporating these techniques in your planning (see Figure 2).

Conclusion

The mechanics of the battle staff's battlefield visualization process are techniques that will help produce better synchronized plans (prior to the issuance of an operations order), when used in conjunction with the military decision-making process. It places art into the science of the MDMP. The key to the technique is to afford the battle staff every opportunity to see the battlefield. Remember, this takes training in the art of wargaming and needs inclusion in your TOC SOP prior to deployment.

Wargaming from a sandtable enables all the battle staff to see the terrain while wargaming. The sandtable's larger scale and relief provides a real-life 360-degree perspective missing from a map. The leaders' reconnaissance ensures the sandtable is accurate and more importantly prepares the battle staff for the wargaming session through well thought out and well integrated estimates. Now that the battle staff can visualize the battlefield through the eyes of the commander and their fellow battle staff members, it is well on its way to becoming a team. The XO is now ready to subdue and rule the once feared beast called synchronization, before he and his battle staff depart from Indostan.

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The Tank Mine Clearing Blade: Eagle or Albatross?

by Captain John T. Ryan, Captain P. Kevin Dixon, and Sergeant First Class James L. Richardson

"Red 1, this is Black 6. Send the plow tank forward." 2LT Bill Hardy sent his wingman forward to clear a path through the enemy minefield. This was the crew's first actual use of a plow and their ability to employ it properly concerned him. The platoon rehearsed breaching in the assembly area but did not drop the plow in fear that it might break and be unavailable for the mission. A loud explosion interrupted 2LT Hardy's thoughts.

"Red 2, this is Red 1. SITREP over."

"Red 1, this is Red 2. We didn't have enough spoil in front of the blade when we hit the first mine and it blew up and broke our track."

"Send the back-up tank."

"Red 1, this is Red 2. We can't. The plow on the back-up tank dropped accidentally just after LD and broke — they're not back up yet."

Great, thought 2LT Hardy. The other plow is still in the UMCP on the 13 tank; how am I going to explain this to the CO?

The purpose of this article is to provide units a primer on the tank mine clearing blade that outlines the doctrine, tactics, techniques, and procedures for employment and addresses some of the most common problems seen at the National Training Center (NTC).

Scenes similar to 2LT Hardy's occur far too frequently at the NTC. Despite the fact the tank mine clearing blade (plow) is a critical task force asset, units seldom use it to its full potential. Frequent mechanical failures, insufficient crew training, and improper tactical employment often make the blade an albatross for those units so equipped. More often than not, a lack of crew training directly causes the maintenance problems. In turn, the

maintenance problems inhibit the unit's ability to train with the blade. It is a vicious circle that leads to most units' inability to mechanically breach obstacles.

General

According to FM 20-32, *Mine/Countermine Operations,* the mine clearing blade "...is used to extract and remove land mines from the minefield. It consists of a blade arrangement with scarifying teeth to extract mines, a moldboard to cast mines aside, and leveling skids to control the depth of the blade."

"The mine clearing blade lifts and pushes mines, which are surface-laid or buried up to 12 inches, to the side of a track. The blade creates a 58-inch cleared path in front of each track. The skid shoe for each blade exerts enough pressure to activate most single-pulse mines and effectively clears a section of the centerline by explosive detonation. This action may disable the blade. A dog bone and chain assembly between the blades defeats tilt-rod fused mines."

FM 20-32 further states that the mine clearing blade will not defeat multiple impulse pressure fuses and that mines armed with antihandling devices, antidisturbance devices, or magnetic and seismic fuses may activate and disable the blade when lifted. So, while the mine clearing blade is an effective tool for clearing a lane through an obstacle, it is not "mine proof" and units must use caution when considering its use as the sole means of mechanical breaching. However, mines do not disable the mine clearing blades at the NTC, maintenance does.

Mechanical Failure

The old adage that "training is maintenance and maintenance is training" certainly applies to the mine clearing blade. During the course of a 14-day rotation, a typical Bn/TF has an average of two out of six tank mine clearing blades fully mission capable (FMC) for any given mission. This clearly has a serious impact on a unit's ability to train in countermine operations. Many commanders decide not to train or rehearse with the operational blades they do have. They feel that if it gets broken, chances are it will not get fixed anytime soon.

Although the blade can successfully execute a mechanical breach when less than fully mission capable, blade crews are not as effective when the blade is not. The need to manually raise and lower the blade, or the inability to plow effectively due to missing parts, significantly increases the chances that enemy fires or mines will prevent the crew from accomplishing their mission. The following are the most common blade maintenance failures we see at the NTC. These three problems comprise approximately two-thirds of all blade failures we see.

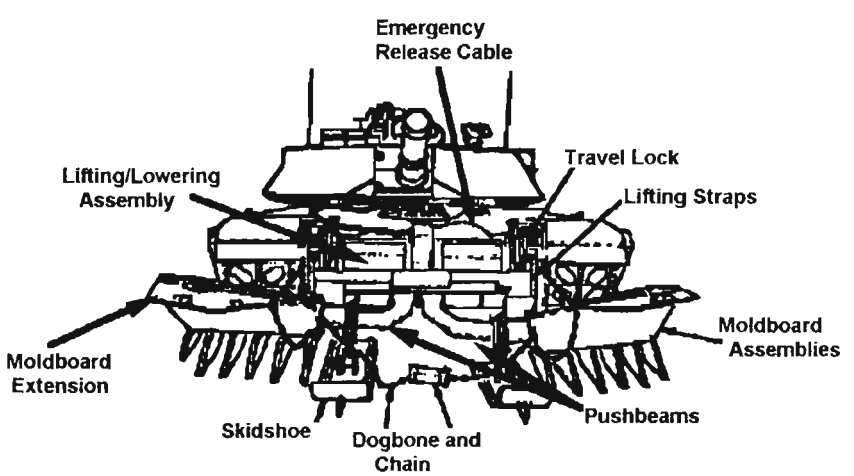


Figure 1. Location and Description of Major Components

●Broken lifting straps. (See Figure 1) The nylon lifting straps that raise and lower the blade suffer much abuse and become cut and frayed by concertina wire or other sharp objects. Consequently, they break when under load. To prevent damage to the straps, some units bolt wire catchers, similar to those on the old M151 bumper, on the moldboard in front of the straps.

The straps also break frequently when the crew attempts to lift the blade with spoil on it. (When crews do this, the straps bear the additional load of the spoil and they break.)

●Inoperative electric lifting motor. The most common problem units experience with the motors is that the brushes burn out or one of several electrical relays malfunctions. Unfortunately, the only authorized repair for burnt-out brushes is to have a DS level mechanic replace the entire motor. To complicate matters further, the German-made motors often take several months to come in, once ordered.

The contract mechanics at the NTC file the brushes from an old M1 or M2/3 starter and use them in the lifting motor. This reduces blade down time from several months to only three to four hours. The electrical relays, on the other hand, are not particularly hard to acquire through normal supply channels, but most tank units do not keep them on hand. In a pinch, check with a sister mech battalion for the part. The relays (see Figure 2 for NSN) are identical to those found in the M2/3 electrical system.

●Sheared travel lock spindle and brackets. The travel lock spindle usually shears when the blade drops or hits something while the vehicle is moving at high speeds. When the spindle shears off, the downward motion of the blade causes the remainder

NSN	NOMENCLATURE	U/I	QTY
4010-01-278-1216	Cable, Emergency Release	ea	2
2510-01-276-7138	Push beam, L.H.	ea	1
4010-01-277-5653	Preventive Chain Assy.	ea	2
4020-01-289-8249	Strap, Lifting	ea	6
5945-01-277-0085	Solenoid	ea	2
5945-01-277-0087	Solenoid Limit Switch	ea	2
5945-00-500-7195	Relay	ea	1
5945-00-686-6877	Relay	ea	1
6105-01-277-0295	Motor, 3 HP	ea	1
5315-01-277-5641	Pin, Attaching	ea	2
3040-01-K44-2243	Link	ea	1
5315-01-277-5643	Spindle	ea	4
3120-01-277-5652	Travel Lock Roller	ea	4

Figure 2. Recommended PLL Listing

of the spindle to bend or break the bracket in which it is mounted (See Figure 3). For some reason, the spindles on the left travel lock break considerably more often than the right, and in every case the bracket breaks through the bolt holes. The only way to fix the bracket is to replace the entire push beam. This is a very time consuming operation that the crewmen can avoid if they use caution when driving with the blade.

Once the blades break, units seldom get the parts to repair them during the rotation. Most units maintain very little if any PLL for the blade since it is a kit and not a reportable item. Therefore, units are reluctant to add these additional lines to their already limited PLL listing. So, they must order the repair parts, which have an exceptionally slow turn-around time.

The items in Figure 2 are a sample PLL stockage listing for a battalion equipped with twelve blades. These items represent a twelve month part demand history at the National Training Center. Keeping these parts on the unit PLL should allow for rapid blade repair on the battlefield.

Crew-Level Training

As indicated earlier, proper crew-level training can prevent the majority of the mechanical failures and mine related casualties. More importantly, proper blade training will lead to an increased probability of mission success through the ability to rapidly breach obstacles. However, many crews arrive at the NTC with little or no formal training or experience with the mine clearing blade.

Some contributing factors to this include the lack of an Army-wide comprehensive training and licensing program for tank crews. This would ensure that crews meet the standard prior to operating the blade on the battlefield. Other factors include units' apprehension about using the blade in training for fear of breaking it, or because the unit has no operational blades to train with.

Also, when they do train, most units habitually only train those crews whose tanks have blades. However, due to vehicle maintenance or other tactical considerations, non-blade crews often must employ the blade in a battle and the results are disastrous. For these reasons, we recommend that units thoroughly train and license all tank crews on the blade.

Currently, there is no single source manual for all crew-level mine clearing blade doctrine, tactics, techniques, and procedures. The three main documents that contain most of the basics for crew-level tank plow maintenance and employment are: TM 9-2590-509-10, *Operator's Manual for the Mine Clearing Blade;* TM 9-2590-509-23 & P, *Unit and Direct Support Maintenance Manual;* and FM 20-32, *Mine/Countermine Operations.*

Without reiterating all of the information included in these manuals, the following is a collection of observations and some recommended techniques and procedures for tank plow employment.

Plan: Many leaders fail to consider the 7,560-pound blade kit's effect on the tank when they develop their plans. While the blade has little effect on the tank's overall speed, it greatly reduces its maneuverability in rough terrain. Crews that try to traverse rough terrain at high speeds cause most of the mechanical failures by ramming the blade into rocks, wadis, etc. In defense of the crews, they are only trying to keep up with the rest of the unit. Thoroughly analyze the terrain with regard to the plow when planning routes.

Plan

- Analyze the Terrain
- Select Routes
- Position Blade Crews on Right Hand Side of the Formation

Also, drivers of blade tanks cannot see to the right side of their vehicle because the power cable enters the vehicle through the right periscope

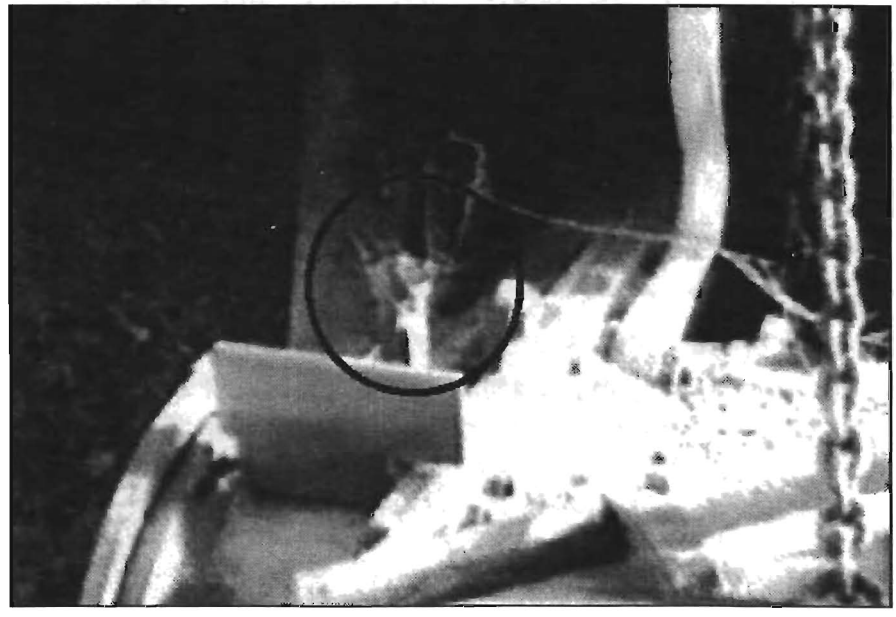
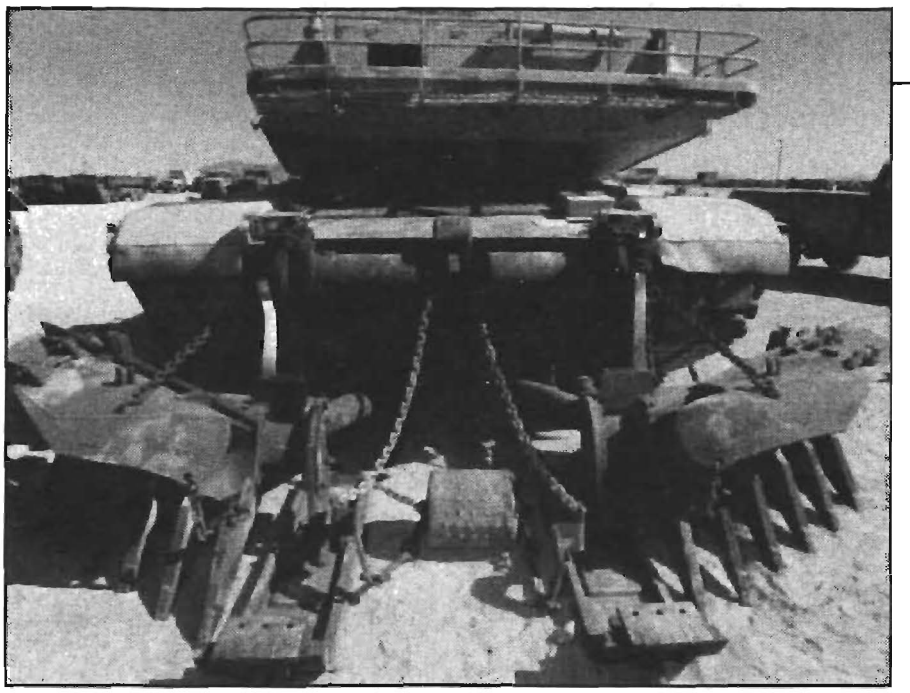


Figure 3. Sheared travel lock spindle and bracket.



opening. This makes it difficult for the driver to maintain formation without a lot of guidance from the TC. Try to position the plow tanks on the right side of the unit formation if possible.

Preparation: Drivers often inadvertently leave the ON/OFF power switch on the control box in the "ON" position. Subsequently, they sit or step on the RAISE/LOWER switch and cause the lifting motor to engage while the plow is in travel lock. This quickly burns out the lifting motors and the relays. To prevent this, securely mount or stow the control box in the driver's compartment and disconnect the main harness from the slave receptacle until ready for actual use.

Prepare

- Secure Control Box
- Disconnect Main Electrical Harness
- Insert Travel Lock Hitch Pins
- Attach Moldboard Extensions
- Adjust Plowing Depth
- Secure Manual Release Cables
- Stow Emergency Lifting Kit and Tools

Crews sometimes neglect to properly prepare the blade prior to an operation. This is the cause of many real life and simulated battle damage casualties and failures. To prevent this, attach the moldboards prior to plowing. The extensions push the spoil and mines clear of the lane so they do not roll back under the plow tank's tracks. Ensure that the travel lock hitch pins are in the travel lock until it is actually time to drop the plow. This prevents the travel lock from disengaging prematurely and dropping the blade. Also, adjust the plowing depth to an 8", 10", or 12" depth, based upon the expected soil type — the softer the soil, the greater the depth. (The blade will not work effectively in some types of soil — namely rocky or frozen ground.) In addition, secure the emergency release cable handle near the driver's hatch with tape or a strap. Frequently, when the driver has to use the emergency release to lower the blade, the cable is out of his reach and he must climb out of the hatch to pull it. A piece of "100 mph tape" will hold it in place by the driver's hatch. Finally, stow the manual lifting strap and the tools required to open the #1 skirt together in an easily accessible place. This enables the crew to rapidly secure them and raise the blade manually if necessary.

Execution: When you receive the order to initiate plowing, seek cover, if possible, pull the travel lock hitch pins, attach the main electrical harness to the slave receptacle and move to the beginning of the lane. Do not move the tank at high speeds with the travel lock pins removed as the plow is likely to drop unexpectedly and damage the plow and injure the crew. At the beginning of the lane, orient the tank in the proper direction of travel prior to dropping the blades. The blade achieves the best plowing width during straight line plowing. Next, close all the the hatches and traverse the main gun tube to the side to prevent damage by mine detonation under the blade.

Execute

- Seek Cover
- Pull Travel Lock Hitch Pins
- Move to Lane
- Orient Tank
- Lower Blade
- Close Hatches
- Traverse Gun Tube
- Begin Plowing 100 Meters From Minefield
- Complete Plowing 100 Meters Beyond Minefield
- Back Out of Spoil (2 Meters)
- Raise Blade
- Insert Travel Lock Hitch Pins

One of the more common mistakes that crews make when employing the blade is that they drop too close to the minefield. Consequently, the plow does not reach proper plowing depth prior to striking the first mine. FM 20-32, *Mine/Countermine Operations,* states that the lane should begin 100 meters from the estimated leading edge of the minefield. The lane should also extend for another 100 meters beyond the estimated far edge of the minefield to ensure that it extends through the entire minefield. This allows for a tactical safety factor.

Operationally, however, TM 9-2590-509-10 states that the crew must lower both moldboards at least 32 feet (10 meters) prior to the beginning of the cleared lane to allow the moldboards to reach operating depth. So, in a deliberate breach situation, drop the plow 100 meters out from the minefield and begin plowing; if you make unexpected contact with a minefield, ensure that you begin plowing at least 10 meters from the first visible mine.

You can lower the mine blade while the tank is moving up to 8 to 10 MPH (12.9 to 16.1 KPH). However, you should use caution when lowering the blade while moving as it can cause

damage to the blade and injure the crew. When operating laterally on a slope, always drop the uphill blade first. Although the blade will plow through concertina wire effectively, the wire will often cut the nylon lifting straps — avoid wire if possible. At the conclusion of plowing, back up the tank approximately two meters to clear the blade from the spoil prior to lifting. Otherwise, the additional weight of the spoil may break the lifting straps.

Tactical Employment

The individual skills required to operate the mine clearing blade are the foundation for proper tactical employment. Units equipped with blade assets should train multiple crews in the use of the plow. In addition, the plan-prepare-execute methodology is useful in preparing a unit to employ the mine clearing blade to its full potential. Unit commanders provide an environment where well trained crews can execute.

Plan: Effective breaching operations begin in the planning phase. Task organization of the mine clearing blades is a critical first step. In order to become a reliable breaching asset, commanders should mass all tanks equipped with a mine blade. (FM 71-123 p. 6-107). This is a tactical decision based on METT-T. While there are other methods, massing plow assets achieves more consistent results. The reason for this increased performance is easier command and control and the ability to rehearse as a team.

Breach site selection is another planning phase task. Plows perform better on flat terrain. Terrain analysis will reveal more advantageous ground to plow on. A rapid increase or decrease in elevation affects the depth setting on a plow, making it harder to maintain the proper amount of spoil in front of the blade.

The commander should visualize the breach site in his OPORD. Use terrain overlooking the site or a terrain model. Place emphasis on the critical actions that occur in the vicinity of the breach site. These critical actions include when and where to release the travel lock hitch pins and drop the blade, and where to begin plowing.

Preparation: Rehearsals are critical in proper employment of the tank blade. A full-up rehearsal on similar terrain in the most effective way to prepare crews. If time does not permit a full-up rehearsal, crews should at least drop the blade and plow a few meters to ensure the depth setting is appropriate. Commanders should rehearse redundance when employing plows. Rehearsing the exact order the commander intends to employ the plows and their relation to the support force will increase the survivability of the crews. This, coupled with thorough precombat inspections of the blade, will limit surprises at the breach site.

Execution: In order to successfully execute the breach, units have to protect the blade tanks because they are a critical asset in a task force. Commanders must take care to allow the blade crews to find a covered and concealed position to prepare for operations and then direct the crews to the beginning of the lane. Before directing crews to the beginning of the lane, the commander should ensure that the conditions have been set for blade employment. Setting the conditions includes suppressing enemy direct fire systems, obscuring enemy observation of the breach site, and securing the breach site. Overwatch forces must effectively suppress enemy direct fire systems prior to the commitment of the blade tanks as the enemy will target them immediately. Use of artillery-delivered smoke and smoke pots on the enemy side of the obstacle will further enhance the blade crews' survivability.

Task Organization
Breach Site Selection
SOSR

According to FM 71-1 (p. 3-45), the correct sequence of asset employment at the proposed breach site is to: lead with a mine roller to identify the edge of the minefield, fire and detonate an M173 projected demolition charge or MICLIC to destroy most of the mines in the lane, and proof the lane with a mine roller or a mine clearing blade. However, since most units do not have or use the mine roller, they must visually identify the edge of the minefield, then fire the MICLIC, and proof the lane with the mine clearing blade. Simply plowing through the minefield without first firing the MICLIC is a high risk operation as the first few mines are likely to disable the blade and the crew.

Conclusions

In conclusion, the tank mine clearing blade is a valuable task force asset which, when maintained and employed correctly, will significantly enhance a unit's ability to mechanically breach obstacles. Proper blade training and maintenance procedures will ensure that the unit has fully mission capable equipment and trained crews available when the mission requires it. If 2LT Hardy used the tactics, techniques and procedures listed above, he would have nothing but success to explain to his commander.

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Developing Tank Crew Collective Tasks

by Sergeant First Class John M. Duezabou

As tankers, we have some work to do to comply with FM 25-101, *Battle Focused Training*. That manual, in its chapter on development of mission essential tasks, talks about selecting squad collective tasks to support the platoon collective tasks that in turn support the company METL.[1]

For some career fields, this simply means opening the ARTEP-MTP and picking which squad tasks support the platoon's tasks. It's not that easy for us, because there are no standard tank section or tank crew collective tasks in our platoon MTP.[2]

Some may argue that we don't need collective tasks any lower than tank platoon level. After all, a platoon has only 16 soldiers. Besides, we have the tank tactical tables.[3] Tables B and C cover tank crews and Tables D and E deal with sections. Aren't they enough?

Platoon Collective Task List

17-3-0100 Perform Tactical Planning
17-3-0101 Prepare for Tactical Operations
17-3-0102 Perform Precombat Checks
12-3-C021 Perform Consolidation & Reorganization Activities
17-3-0105 Employ Command & Control Measures
17-3-0209 Execute Travelling
17-3-0210 Execute Travelling Overwatch
17-3-0211 Execute Bounding Overwatch
17-3-0212 Conduct Tactical Road March
17-3-0217 Perform Fire & Movement
17-3-0219 Perform Attack by Fire
17-3-0220 Assault an Enemy Position (Mounted)
17-3-0221 Execute Actions on Contact
17-3-0225 Defend
17-3-0227 Conduct Hasty Occupation of Battle Position
03-3-C011 Prepare for Chemical Attack
03-3-C015 Respond to Chemical Attack
03-3-C016 Perform Chemical Decontamination

Figure 1

I submit that the tactical tables aren't enough. While they are excellent exercises, they don't cover many essential collective tasks. Besides, if the tactical tables were sufficient, we wouldn't have a platoon ARTEP-MTP, because Tactical Tables F and G already cover platoon collective training.

My unit also felt that the platoon ARTEP tasks weren't the whole answer, either. While we found no need for separate section-level tasks, the same couldn't be said for crew tasks. Some platoon tasks cover crew actions adequately, but others don't go into enough detail to properly train and evaluate crews. FM 25-101 seems to agree, as it includes a tank crew collective task, Prepare Firing Position, as an example.[4]

Another reason for having crew collective tasks is that platoon tasks don't really apply to the two tanks in a company or battalion headquarters section. Anyone who has tried to train headquarters tank crews using a platoon ARTEP knows how difficult it is.

While we suspect that standard crew collective tasks are being developed, we felt we needed them right away to train properly for combat. With that in mind, we developed our own.

The Process

We began with the platoon collective task list developed by our platoon leaders and platoon sergeants, and approved by our company commander (Figure 1). The platoon leaders and platoon sergeants got together with the wing tank commanders and analyzed each of the 18 tasks on the list. They looked at each critical sub-task and determined what a crew had to do for the platoon to be successful.

Where the platoon task didn't spell our crew actions in enough detail, we wrote our own tasks. We derived conditions from those of the associated platoon tasks, and set standards so that meeting them allowed the platoon to meet its standards. In some cases, we incorporated actions from the B-series tactical tables.

We used several references to try to meet doctrinal requirements with our tasks, conditions and standards. The most helpful were the platoon manual[5] and MTP, the 19K-series STPs, and FM 17-12-1, as well as our own tactical SOP. We also used the company manual[6] and associated MTP,[7] plus the old H-series cavalry squadron ARTEP,[8] which includes tank crew collective tasks.

The Results

We ended up with 12 crew tasks to accomplish our 18 platoon tasks. We found one platoon task, Employ Command & Control Measures, requires no actions at crew level. Five other platoon tasks cover crew actions in enough detail to train and evaluate crews.

For seven others, we had to write one crew task each. This was usually just a case of spelling out crew duties to accomplish the platoon task and setting a crew standard. The remaining five platoon tasks required more than one crew task to accomplish. Often, the same crew task applied to more than one platoon task. The relationship between crew and platoon tasks is shown in Figures 2 and 3.

Our crew tasks are listed as follows. Other units would probably have to modify them to fit their own SOP, as well as adding or deleting tasks to fit their platoon list and company METL.

Developing these crew tasks helped us decide which leader and soldier individual tasks were really mission essential. They have been very valuable in battle focusing our crew training.

Task: Prepare For Tactical Operations (Ref: FM 17-15, PLT SOP)

Conditions: The crew is operating tactically and has been ordered to be

CREW TASKS	PLATOON TASKS								
	Perform Tactical Planning	Prep for Tactical Operations	Perform Precombat Checks	Perform Consolidation & Reorganization	Employ Command & Control	Execute Travelling	Execute Travelling Overwatch	Execute Bounding Overwatch	Conduct Tactical Road March
Platoon task is enough	X					X	X	X	
None					X				
Prepare for Tactical Opns		X							
Perform Precombat Checks			X						
Consolidate and Reorganize				X					
Participate in Tactical Road March									X

Figure 2. Platoon Task to Crew Task Matrix, Part 1

ready for a mission at a given time. Threat situation is as stated in OPORD.

Standard: Crew is ready for mission at time stated in the OPORD.

Subtasks and Standards

1. Crew maintains security per OPORD readiness condition (REDCON).

2. Crew performs preparation tasks in order shown in SOP, or as otherwise directed by higher.

a. Crew performs before-ops maintenance on tank per TM & corrects all deficiencies or reports them on DA Form 2404 to PSG.
b. Crew cleans and checks weapons per TM. Crew corrects all deficiencies or reports them on DA Form 2404 to PSG.
c. Crew refuels vehicle.
   1) Positions vehicle as directed by fueler crew.
   2) Mans portable fire extinguisher from a position where immediate response is possible.
   3) Attaches ground connection near fuel filler nozzle.
   4) Tops off all fuel tanks.
   5) Records quantity received in log book.
   6) Returns to assigned position within 20 minutes.
d. Crew loads ammunition to basic load.
   1) Positions vehicle at rearm point.
   2) Unpacks and loads ammo per TM and load plan. Time limit: 1 minute per main gun round, plus extra 5 minutes if semi-ready door must be opened, plus 1 minute per box of small arms ammo.
e. Crew loads supplies, bulk POL products, water, and food.
   1) Positions vehicle near supply point, or sends a crewman for supplies while vehicle is refueling.
   2) Secures parts, supplies and POL products per load plan.
f. Crew completes loading of vehicle per load plan.
g. Crew prepares individual equipment per SOP.
h. Crew implements sleep plan.

Task: Perform Precombat Checks (Ref: FM 17-15, PLT SOP)

Conditions: The crew is operating tactically and has received a warning order for an upcoming mission. The crew has enough time to prepare. Threat contact is not expected.

Standard: Tank commander (TC) completes precombat inspection (PCI) per SOP. All deficiencies are corrected before the platoon PCI.

Subtasks and Standards

1. TC conducts PCI per platoon SOP.
   a. Inspects crewmen per SOP.
   b. Inspects tank per SOP.
   c. Inspects communications equipment per SOP.
   d. Inspects NBC equipment per SOP.

2. Crew corrects all deficiencies before platoon PCI.

Task: Consolidate And Reorganize (Ref: FM 17-15, PLT SOP)

Conditions: The crew has taken part in a successful platoon or company assault on an objective. The unit has been ordered to prepare for a Threat counterattack.

Standard: The crew takes all steps necessary to secure the objective (consolidates) and prepares to continue fighting (reorganizes) before the Threat counterattacks.

Subtasks and Standards

1. Crew participates in consolidating on the objective.
   a. Crew helps eliminate any remaining resistance.
      1) Provides covering fire for friendly dismounted infantry per leader's orders, OR
      2) Dismounts crewmen with small arms to eliminate resistance while covering them with tank weapons.
   b. Crew occupies hasty firing position per crew task of same name as directed by higher.

2. Crew reorganizes to sustain the fight.
   a. Crew reloads machine guns and redistributes main gun ammo to ready areas.
   b. Crew gives first aid to crewmen wounded in action and moves them to a covered position.
   c. TC sends modified SITREP to PSG by runner stating situation and status of ammo, fuel, vehicle, and crew (casualties).
   d. Crew conducts essential maintenance.
   e. Crew cross-levels supplies, equipment, and personnel as directed by higher.

Task: Perform Tactical Road March (Ref: FM 17-15, PLT SOP)

Conditions: The crew is part of a larger force that has been ordered to conduct a tactical road march. Threat contact is not expected.

CREW TASKS	PLATOON TASKS								
	Perform Fire & Movement	Perform Attack by Fire	Assault Enemy Position (Mounted)	Execute Actions on Contact	Defend	Conduct Hasty Occupation of BP	Prep for Chemical Attack	Respond to Chemical Attack	Perform Chemical Decon
Platoon Task Is Enough									X
Consolidate and Reorganize (also shown in Fig 2)			X						
Execute Halt In Formations	X								
Execute Moving Formations	X		X	X					
Respond to Section or Platoon Fire Command	X	X	X	X	X				
Occupy Hasty Firing Position	X	X		X	X	X			
Participate in Mounted Assault			X						
React to Initial Contact				X					
Prepare for Chemical Attack							X		
Respond to Chemical Attack								X	

Figure 3. Platoon Task to Crew Task Matrix, Part 2

Standard: The crew performs its duties so that the road march is executed within time requirements.

Subtasks and Standards

1. TC receives the Warning Order/OPORD and briefs crew.
   a. Departure time and SP time.
   b. Formation, order of march, interval and speeds.
   c. Route and locations of halts/critical points, and actions to be taken at them.
2. Crew prepares for tactical operations per crew task of same name and is at proper REDCON for departure time.
3. Crew moves with the unit.
   a. Crew orients weapons and scans sector directed by higher or METT-T/SOP, reports enemy contact per crew task React to Initial Contact.
   b. Crew maintains formation per crew task Execute Moving Formations.
   c. Crew maintains order of march and reports critical points if required by order or SOP.
4. Crew performs proper actions for contingencies.
   a. If the tank breaks down:
      1) Driver attempts to clear the road if possible.
      2) Loader waves other vehicles around and places safety warning indicator behind vehicle.
      3) TC notifies higher or another crew of problem.
      4) Crew posts security and attempts to repair tank while waiting for maintenance assistance.
      5) When tank is repaired, crew rejoins march at rear of column.
   b. If unit deviates from route or there is a break in the column, TC informs higher.
   c. If TC loses sight of vehicle to his front and is unsure where to go, he stops and requests instructions from higher.
5. Crew performs actions at halts per crew task Execute Halt in Formation.
6. Crew communicates with other vehicles using hand arm signals whenever possible.

Task: Execute Halt in Formations (Ref: FM 17-15, PLT SOP)

Conditions: The crew is part of a larger force moving tactically. The leader orders, or METT-T/SOP dictates, a coil or herringbone. Threat contact is not likely.

Standard: The crew halts in the proper position to observe their sector and cover it with fire.

Subtasks and Standards

1. Crew recognizes hand and arm signal, radio message, or tactical situation that requires a halt and acknowledges.
2. TC orders halt and selects best covered and concealed position per formation ordered and METT-T/SOP.
3. Driver occupies directed position.
4. Loader dismounts to provide local security or act as runner if directed by higher or METT-T/SOP.
5. Crew orients weapons and scans sector directed by higher or METT-T/SOP, reports enemy contact per crew task React to Initial Contact.
6. Crew prepares to fire on targets in their sector as directed by higher.
7. If a scheduled halt, crew performs required actions.
   a. Maintenance
   b. Refuel/resupply.
8. If an unscheduled halt, crew performs required actions.
   a. Determines cause of halt.
   b. Relays information per SOP.
   c. Prepares to resume movement when ordered.
9. Crew performs above actions for each type of halt formation (coil or herringbone).

Task: Execute Moving Formations (Ref: FM 17-15, PLT SOP)

Conditions: The crew is part of a larger force moving tactically. The leader orders, or METT-T/SOP dictates, a specific formation. Threat contact is possible, expected, or in progress.

Standard: The crew assumes the proper place in the formation and covers its assigned sector.

Subtasks and Standards

1. Crew recognizes hand and arm signal, radio message, or tactical situation that requires a specific formation and acknowledges.

2. TC orders that formation and orders proper speed and interval as directed by higher or METT-T/SOP.

3. Driver assumes proper speed, position, and interval.

4. Tank commander stays oriented and knows his location.

5. Crew orients weapons, scans sector directed by higher or METT-T/SOP, reports enemy contact per crew task React to Initial Contact.

6. Crew prepares to fire on targets in sector as directed by higher.

7. Driver uses all cover and concealment consistent with METT-T.

8. Crew performs above actions for each type of formation (Column, Staggered Column, Wedge, Vee, Line, and Echelon.)

Task: Respond to Section or Platoon Fire Command (Ref: FM 17-15, FM 17-12-1, PLT SOP)

Conditions: The crew is part of a section or platoon conducting a tactical operation. The leader issues a section or platoon fire command.

Standard: The crew engages the correct target in the proper way.

Subtasks and Standards

1. Crew recognizes when alert element applies to them.
   a. "CONTACT" or platoon color (ex: "RED") alerts the whole platoon.
   b. "ALFA" alerts platoon leader's section only.
   c. "BRAVO" alerts platoon sergeant's section only.

2. Crew fires weapon/ammunition and number of rounds announced. If none announced, uses standard weapon/ammo per FM 17-12-1.
   a. Machine guns for troops or unarmored vehicles within range.
   b. Main gun for all other targets.
   c. Fires battle-carried round first, then switches to preferred type of ammo for subsequent rounds.

3. Crew fires at proper target.
   a. Crew recognizes target description.
   b. If multiple targets, crew fires at correct target first and remaining targets in correct sequence.
   c. Crew fires in fire pattern announced. If no fire pattern announced, crew uses "frontal" fire.

4. Crew fires at the proper time.
   a. If "AT MY COMMAND" is announced, crew lays on target and TC announces "READY" when crew is prepared to fire.
   b. As soon as leader says "FIRE," TC repeats "FIRE" and crew engages target.

5. If fire command is for Support by Fire/Suppress mission, crew fires the number of HEAT/HEP rounds and machine gun bursts per minute announced until it sees a specific target at the suppressed position.
   a. For example, with the fire command "RED - HILLTOP - TRP 2 - SUPPORT - TWO AND FOUR - FIRE!," crew fires two HEAT/HEP rounds per minute and four machine gun bursts per minute at the hilltop.
   b. If crew acquires a specific target in the target area, it engages using the type of ammo and rate of fire needed for destruction, then returns to suppressive fire.

6. Crew fires until target is destroyed or "CEASE FIRE" is announced.

Task: Occupy Hasty Firing Position (Ref: FM 17-15, PLT SOP)

Conditions: The crew is part of a larger force in the offense or defense. The leader has ordered, or METT-T/SOP dictates, that the crew must rapidly occupy a hull-down firing position.

Standard: The crew occupies a hull-down position from which it can observe and fire into the appropriate sector. The crew moves to alternate firing position if necessary.

Subtasks and Standards

1. If tank is exposed:
   a. TC orders driver to seek hide position and employs smoke as necessary to cover movement.
   b. TC orders driver to move to turret-down position and crew scans sector for targets.

2. If tank is not exposed, TC orders driver to move to turret-down position and crew scans sector for targets.

3. On order of higher, crew moves to hull down and prepares to engage targets.

4. TC ensures his tank can place effective fires into appropriate sector.

5. TC orders tank to alternate firing position to avoid accurate antitank fire as necessary.

Task: Participate in Mounted Assault (Ref: FM 17-15, PLT SOP)

Conditions: The crew is part of a larger force ordered to assault a Threat position. A base of fire element is in position to support the assault. The assault may be through an obstacle breach.

Standard: The crew participates in assault so that all Threat resistance on objective is destroyed and objective is secured.

Subtasks and Standards

1. Crew moves with the unit to the last covered and concealed position as per crew task Execute Moving Formations.

2. Crew prepares for the assault.
   a. Driver brings tank on line while remaining in turret-down position.
   b. Crew scans Threat position to determine Threat force size and type, locations of mines and obstacles, and best route to objective. Reports results to higher.
   c. Crew conducts last minute check of weapons systems, vehicle, and equipment.
   d. TC reports to leader when tank is ready for the assault.

3. Tank moves out with unit for assault when ordered.
   a. If assaulting through obstacle breach, moves through breach in column formation per crew task Execute Moving Formations.
   b. If no obstacle, or once past obstacle, goes to line formation per crew task Execute Moving Formations.

4. Crew assaults Threat position firing all weapons to destroy or suppress all resistance.

5. Crew occupies hasty firing position as ordered per crew task of same name to await counterattack.

6. Crew consolidates and reorganizes on objective as ordered per crew task of same name.

Task: React To Initial Contact (Ref: FM 17-15, PLT SOP)

Conditions: The tank is moving independently or is part of a larger force conducting an offensive operation. A Threat force engages the tank.

Standard: The crew reacts immediately and completes initial actions on contact within 1 minute.

Subtasks and Standards

1. Crew member who first observes Threat force gives acquisition report (ex: "TANKS - TEN O'CLOCK").

2. TC issues fire command to engage Threat. Crew returns fire.

3. Driver takes evasive action to seek cover and concealment and to avoid missiles.

4. TC orders/fires smoke to conceal tank if appropriate.

5. TC alerts higher with contact report.

Task: Prepare For Chemical Attack (Ref: FM 17-15, PLT SOP)

Conditions: The tank is part of a larger unit operating tactically. The leader issues a warning order that chemical warfare has started or intelligence suspects that it will start soon. Threat direct fire is not expected, but incoming Threat artillery is possible.

Standard: The crew assumes the required MOPP level within the time standard and is ready for chemical attack before it happens. Crew members, mission essential equipment, food, and water are protected. NBC duties are performed. The crew is able to continue the mission.

Subtasks and Standards

1. TC passes chemical warning order to crew.

2. Crew members prepare for chemical attack.

   a. Assume MOPP level per warning order within time standard.
   b. Wear headgear at all times.
   c. Ensure that mission essential equipment, food, and water are protected.

2. TC supervises preparation, ensuring that:

   a. Crew is at proper MOPP level.
   b. Crew knows NBC attack signals.
   c. Equipment, food, and water are protected.

3. If tank is NBC tank, crew performs appropriate NBC duties.

   a. Deploys chemical alarm and chemical detector paper to give platoon maximum warning.
   b. Inventories chemical supplies and orders resupply through PSG (if not already done).

4. If tank is supporting an observation post (OP), helps provide OP with dug-in position with overhead cover.

Task: Respond To Chemical Attack (Ref: FMs 17-15 & 17-12-1, PLT SOP)

Conditions: The tank is part of a larger force operating tactically. Chemical alarm sounds, detector paper changes color, or other automatic masking event occurs. Direct Threat contact is not expected.

Standard: Crew members mask within 15 seconds, then complete other protective actions within 1 minute and 26 seconds elapsed time. Crew performs other necessary NBC actions and continues mission. They initiate unmasking procedures when appropriate and restock chemical supplies as necessary.

Subtasks and Standards

1. Crew members recognize NBC attack symptom or warning.

2. Crew members mask within 15 seconds, position hood within additional 6 seconds (21 seconds elapsed).

3. Crew members give alarm, close tank hatches, replace CVC helmet and plug into intercom within additional 30 seconds (51 seconds elapsed).

4. Crew members hook into and turn on gas particulate filter system within additional 35 seconds (1 min and 26 seconds elapsed).

5. Crew members perform individual skills decon and assume MOPP level 4.

   a. Administer nerve agent buddy aid if needed.
   b. Decontaminate skin.
   c. Assume MOPP level 4.
   d. Wipe down/spray down critical equipment (handles, hatch edges, etc).

6. If tank is NBC tank, crew performs appropriate NBC duties.

   a. Determines presence/nature of chemical agent with M256 kit.
   b. Prepares NBC-1 report and sends to higher.

7. Crew continues mission.

8. TC initiates unmasking procedures with or without M256 kit.

9. TC request replacement of used NBC supplies from PSG.

Notes

[1]FM 25-101, *Battle Focused Training*, 1990, pp 2-8 & 2-9.

[2]ARTEP 17-237-10-MTP, *Mission Training Plan for the Tank Platoon*, 1988.

[3]FM 17-12-1 w/Change 3, *Tank Combat Tables, M1*, Base FM 1986, Ch 12. **NOTE:** Tables were not published in the new two part FM 17-12-1, but will be moved to the new FM 17-15 when it comes out.

[4]FM 25-101, Figure 2-35, p 2-22.

[5]FM 17-15, *The Tank Platoon*, 1987.

[6]FM 71-1, *The Tank and Mechanized Infantry Company Team*, 1988.

[7]ARTEP 71-1-MTP, *Mission Training Plan for the Tank and Mechanized Infantry Company and Company Team*, 1988.

[8]ARTEP 17-55, *The Armored Cavalry Squadron*, 1982.

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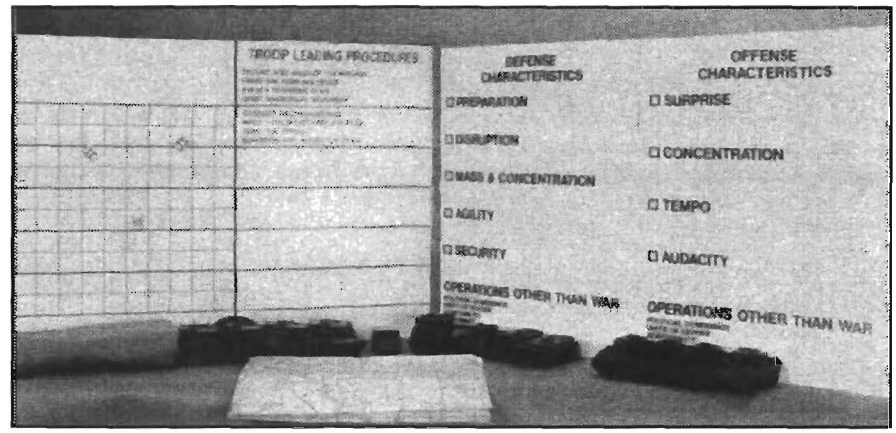


Complete AAR package includes AAR format chart, scale models of U.S. and Threat vehicles, and maps.

Improving After-Action Reviews With a Tactical Briefing Package

by Sergeant First Class David D. Dunham and Captain Frank V. Sherman

The new Armor second lieutenant wipes the rain from his map as he depresses the push-to-talk button, "Blue, this is Blue-1. Move to checkpoint 3 and immediately prepare for the AAR. Acknowledge, over."

His platoon had just completed a movement to contact and as he moves to CP3 he begins to wonder about his platoon's performance. He thinks they did well but his tank was destroyed early in the battle by the forward security element and he could not monitor the remainder of the battle. He hopes the platoon sergeant took over and destroyed the FSE, but everything was moving so fast. As he approaches CP3, he can see the platoon observer/controller preparing for his AAR and the remainder of his platoon's CVKI lights "flashing." His only thought is, "does it ever stop raining here?"

For the platoon, the next hour spent discussing its plan, preparation, and execution will be the most important throughout the mission. The entire platoon participates in the After Action Review (AAR) process, self-learning a number of key points.

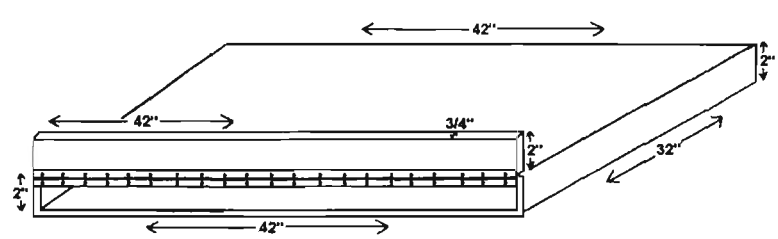
This article focuses on preparation of the platoon AAR and the package used to present it. Units can use this information to build their own AAR packages to fit their particular needs and familiarize their leaders with the AAR process. The package described here is currently in limited use at the Combat Maneuver Training Center (CMTC) with complete fielding expected by the end of FY94.

In order to have an armed force that is combat-ready, capable of deploying to any region, and accomplishing a mission successfully, it must be well trained. This process begins with the individual, quickly accelerates through the crew and section level, culminating at the fundamental maneuver element, the platoon. Maintaining the focus at platoon level, we sensed a problem when asked what the platoon observer/controllers (O/C) at the CMTC used as training aids to facilitate AARs. To our surprise, we found that platoon AARs varied greatly between O/C teams, missions, and the personalities of each platoon O/C.

Platoon O/Cs do not have the luxury of mobile after action review vans, spacious theaters, or sophisticated computer systems with which to build and present their AARs. O/Cs learn a specific AAR format, but the end product is quite varied. Our solution was to design and develop a standard presentation package so that platoons would receive a high quality AAR every time, and to the same standard, regardless of the O/C or mission. By gathering input from the various O/C teams, we learned that the package would have to meet certain requirements but remain generic enough for use by all platoon O/Cs. In all cases, the package must incorporate a briefing board with components that support sand-table demonstrations. Additionally, the following attributes are essential: multi-purpose, portable, easily stored, weather-proof, and visible to a platoon-size audience. Using this information as a starting point, the AAR/Tactical Briefing Package was developed.

It consists of four major components. The first is a metal sandwich board, 41" by 31", hinged in the middle and painted white. Three sides of

AAR Storage Box



the board are blank, allowing ample room for notes or diagrams. The fourth side is gridded to facilitate drawing fire plans or platoon positions and lists the Troop Leading Procedures (TLP) to cue the platoon to self-discover problem areas. Below the TLP is a separate lined portion reserved to list key points or annotate checklists. An assortment of 1:5,000 scale map sheets and magnetic vehicles help the platoons discuss their plan.

The second component is a set of three plexiglass charts, 22" by 31". Magnetic tape attached to the back allows mounting on the sandwich board or other metal surface. These charts separately list the characteristics for offensive missions, defensive missions, and the AAR format. With the introduction of the Complex Battlefield, which includes civilians on the battlefield, hostile or friendly factions, police or para-military units and United Nations forces or agencies, the offensive and defensive characteristics charts sub-list the imperatives of Operations Other than War for easy reference. The entire board and charts can be placed in a heavyweight canvas bag with a Velcro closure to weatherproof the package.

The third component is an assortment of 1/35-scale vehicles for use on terrain models or to demonstrate formations. Different vehicle sets are available to allow the O/C the flexibility to demonstrate key points, possibly the actions of a flank platoon or a company emergency resupply. Normally, a maneuver platoon O/C will carry four M1s, four M2s, an M113, a HMMWV, an M577, a T-80, and a BMP2. The vehicles are stored in an empty MRE box.

The final component is the platoon O/C battle book. This is a 16-page notebook that allows the O/C to make notes and observations in the AAR format. The battle book includes defensive and offensive missions and lists combat functions in the plan, prep, and execute outline. This format facilitates a rapid and organized compilation of thoughts and observations into a quality AAR with little deviation from the AAR format. It also ensures that all the combat functions are addressed. Upon completion of the AAR, the battle book, with notes and observations, may be given to the platoon leadership for later review.

When stored in the HMMWV, the briefing board in its canvas bag slides into a wooden storage box approximately 2" deep and roughly the dimensions of the rear cargo area. The MRE box containing the model vehicles fits securely on the floor in one of the rear passenger compartments. This storage configuration limits loss of cargo space. The package is accessible by lowering the tailgate.

Noncommissioned officers developed this package to assist in the presentation of a quality AAR for other noncommissioned officers, but it has shown itself to be much more versatile. In a tactical setting, units can use the package as an invaluable aid to process and conduct operation orders. As part of the commander's estimate, wargaming is easily accomplished using the 1:5000 scale maps and three acetate drop sheets to illustrate the courses of action. Posting locally produced charts that describe staff considerations during wargaming and using the gridded area as a decision matrix can streamline this process to the desired goal of a staff drill. During limited visibility operations, the board's blank sides provide ample space to post maps or make detailed drawings of the objective to facilitate backbriefs or rehearsals. The package's durability, and capability of repeated use eliminates the commander's often frantic search for something to draw on.

The package has also proven itself useful when a company commander gives his oral operation order. The ability to list the key points allows subordinates a visual reference to copy key information if missed when first covered. It is particularly helpful as the commander explains his mission intent, either by drawing directly on the board or using the magnetic vehicles and maps.

In reality, the number of uses for this package is limitless. Comments from the field welcome the standardization of the platoon AAR and how the board facilitates self-learning. It is large enough for the whole platoon to see, understand, and therefore participate. The days of O/Cs drawing formations on their 1:50,000 map or arranging rocks on the ground are over. Less time is spent explaining the AAR process to the platoon, allowing more time to focus on areas that need improvement so that they can execute the next fight with greater confidence.

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The Decisive Point

by Captain David J. Lemelin

It is an error to concentrate one's strength without an entirely definite purpose and anywhere other than a decisive place.

- Helmuth Graf von Moltke

A doctrinal technique for focusing planning and concentrating combat power is for the commander at brigade, battalion task force, and company level to designate the decisive point for any given operation. The term decisive point is found in some doctrinal manuals, however, the concept remains undefined and vague. FM 100-5, *Operations,* says:

Decisive points provide commanders with a marked advantage over the enemy and greatly influence the outcome of an action.

Decisive points are often geographical in nature, such as a hill, a town, or a base of operations. They could also include elements that sustain command, such as a command-post, critical boundary, airspace, or communications node... Commanders designate the most important decisive points as objectives and allocate resources to seize or destroy them.[1]

This paragraph does not offer a definition of a decisive point, but gives examples. It still does not provide the task force or company commander with a solid explanation of what a decisive point is, or how to use it in planning and execution. FM 100-5 clearly states that there is a difference between decisive point and center of gravity, but does not explain why they are different. The assertion is valid, however, because a decisive point, as defined later, is related to the friendly unit's purpose, while a center of gravity is related to the enemy unit's vulnerabilities.

FM 7-10, *The Infantry Rifle Company,* in its excellent section on company command estimate, talks about a single decisive point that is the beginning of course of action (COA) development. FM 7-10 goes on to describe possible decisive points, related to the company's mission, in terms of terrain, enemy units, or assets and friendly vulnerabilities.[2] However, even this description is inadequate as a definiton and does not go far enough in describing how to use this essential concept.

A good definition of decisive point, one in use at the Armor Officer's Advance Course, is the following:

An enemy force or asset, key terrain, critical time, or combination thereof, where the applied effects of the unit's combat power will lead to accomplishment of the mission or achievement of the mission's purpose.

This definition is more specific than anything in current doctrine and encompasses the concepts suggested by FM 100-5 and FM 7-10.

At the tactical level, each mission has **one** decisive point per level of command. The commander, with input from his staff, designates the decisive point as a part of mission analysis. The decisive point is based on the purpose of the unit's mission, as articulated in the unit commander's intent. It is, as stated in the definition above, a specific thing, not an action. "The decisive point for this mission is the enemy platoon at NK123456" or "...the high ground west of the town of Midway." Now, the commander and staff must determine a manner to apply the unit's combat power against the enemy platoon or the high ground during COA development. So, the decisive point is designated independent of the scheme of maneuver and is therefore not "destruction of the enemy platoon..." or "securing of the high ground..." since each possible COA may apply the unit's combat power differently at the decisive point.

In an offensive example, Figure 1, the task force commander and staff have completed mission analysis and determine their mission as:

TF 1-10 attacks 200600 MAR 19XX to seize OBJ Yellow and secure passage lanes in order to pass 2d Brigade forward to conduct the division main attack.

The commander has stated the purpose and endstate of his intent as:

"The purpose of our attack is clearly to secure the passage lanes and pass 2d Brigade. The earlier we can achieve this, the better. Our endstate then is at least one lane secured and enough combat power there to facilitate 2d Brigade's passage. All enemy forces that can interfere with the passage must be fixed or destroyed. If we accomplish these things, we will be successful."

Now, before developing COAs, the commander must designate the decisive point to focus the efforts of the task force during planning and execution. He says:

"The decisive point for this mission is the hill vicinity ES664002. If we control that hill, we can control Route Alpha, the preferred passage lane, and we will be able to support the passage with direct fire to the north."

All COA planning begins at the decisive point. The commander and staff determine the combat power necessary and budget that force for the **main attack** at the decisive point. It is important to note here that a unit may designate different forces as the main effort, shifting throughout an operation, but a unit only conducts **one** main attack. As FM 71-2, *The Tank and Mechanized Infantry Battalion Task Force,* states:

In a battalion task force attack there is only one main attack. All other elements of the task force support the main attack... Both main attack and main effort are mechanisms for allowing the concentration and coordination of combat power, but they are not synonymous. The main attack is the task force's main effort at the decisive phase of the attack.[3]

While clearly defining main attack," FM 71-2 still does not define the "decisive phase." Decisive point, as defined above, provides the needed focus for the main attack. Usually, as in our example, the decisive point is further designated as an "objective." Forces are arrayed to be committed against that objective with sufficient

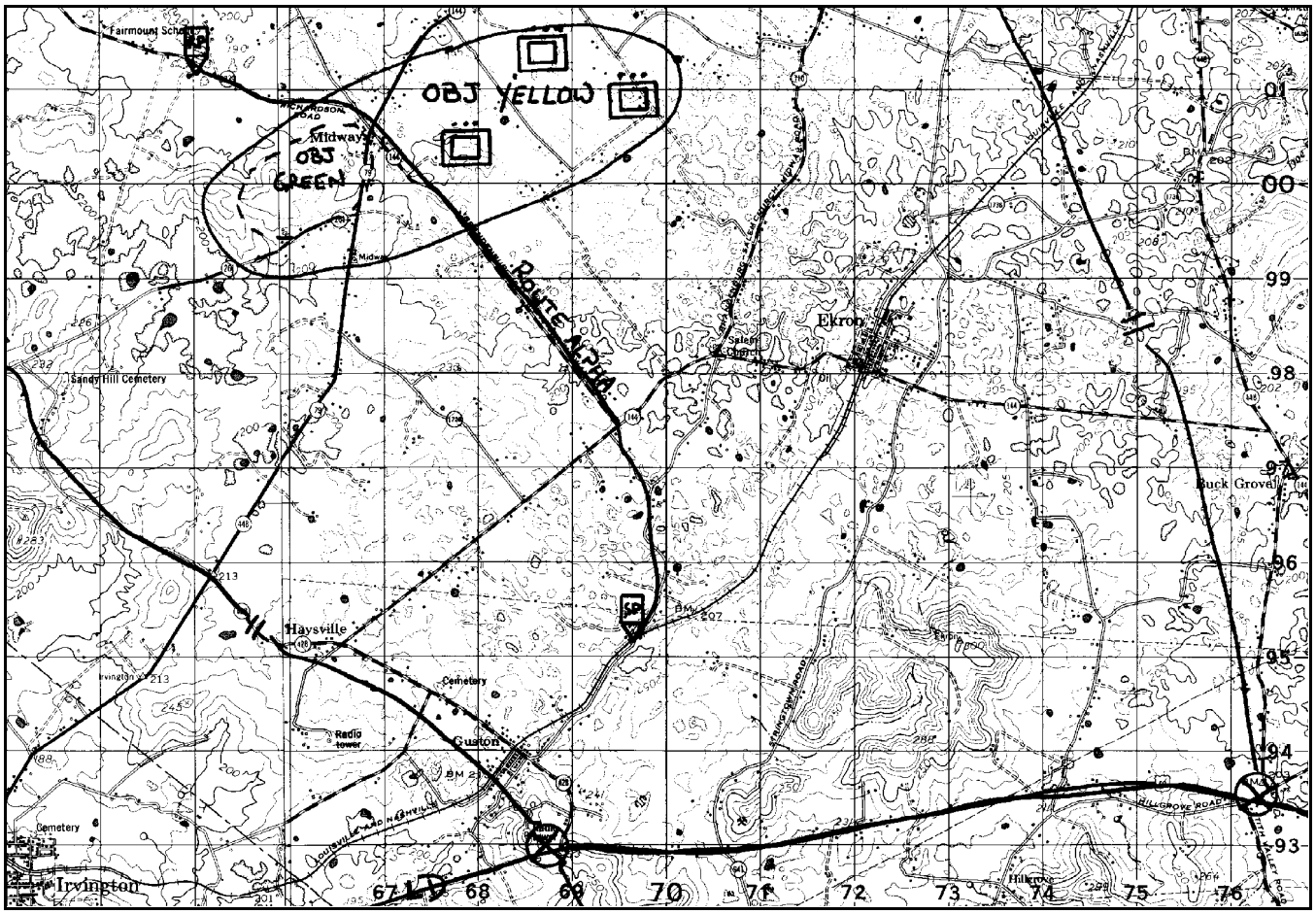


Figure 1

combat power to, in this case, "secure" the decisive point. The force may "seize," "destroy," "fix," etc. the objective that is the decisive point, whichever mission is appropriate for the situation. The overriding principle being to **mass combat power at the decisive point.** FM 100-5, echoing Napoleon I and Clausewitz, defines the principle of war "Mass" as:

> *"Mass the effects of overwhelming combat power at the decisive place and time."*[4]

Again, we understand the business of massing effects; the problem is usually finding the decisive place and time. By analyzing the situation and designating the decisive point, the commander clearly shows where combat power must be massed for the unit to be successful.

Returning now to our example, the task force staff now begins to develop COAs, starting with the task force's main attack and its objective already determined. The decisive point is designated as Objective Green. The remainder of the scheme of maneuver is designed to support and posture to execute the main attack. Given the link between the mission's purpose and the decisive point, and the difficulties of protecting the force conducting the main attack, it is usually advantageous to conduct the main attack as early in the operation as possible. The more activity prior to the main attack, the greater the risk of dissipating the unit's combat power before its concentration at the decisive point is required. Additionally, if the unit achieves control of the decisive point early in the operation, and thereby achieves its purpose, then the remainder of the enemy's combat power is rendered irrelevant, to be dealt with only if necessary.

Our example task force may develop a COA that uses a force to initially fix the enemy platoons that could influence the main attack, such as the platoons at ES686014 and ES696008, a supporting attack to fix or suppress the platoon at ES678003, then conduct the main attack with a relatively large force to seize Objective Green, the decisive point. Once Objective Green is seized, the enemy cannot influence Passage Lane 5, so the task force begins passing 2d Brigade. Finally, the task force attacks only those enemy forces necessary to complete seizure of Objective Yellow.

This situation illustrates another advantage of the decisive point as a method for concentrating combat power in the offense. That is, we initially **only** fight the enemy forces necessary to achieve our purpose. Then, once we control the decisive point, we are in an advantageous position to complete the mission. We have, in most cases, disrupted the enemy defense and have a distinct psychological and positional advantage.

Note also that if a unit's purpose was enemy destruction or was in some other way oriented on the enemy force, the decisive point might be different. It could be a terrain feature, selected to achieve positional or psychological advantage, based on disposition of the enemy force. An enemy-oriented decisive point might be a particular enemy force against which the unit, if its combat power were concentrated, could gain the same advantages discussed above.

Certainly, in many situations, the decisive point will not be obvious. In

Continued on Page 42

Combat Vehicle Command and Control

CVC^2, an improved version of the M1A2's IVIS system, is now being studied. This is how one version under development would work...

by Captain Derek C. Schneider

"They're all here, sir," his loader announced. CPT Steiner looked up from his tactical display and thought, "Here it goes." He dismounted his M1A2 tank and approached his men. He could have done this over the net but he wanted one last chance to see his men and for them to see him.

"As you already know, in the next few hours we will be in battle. Unlike the last war, this one won't be against inferior equipment or personnel," CPT Steiner began. "The enemy has the latest generation of Western tanks. He has the same 120-mm gun, the same type armor and fire control systems. He is highly motivated and well trained. We can't rely upon our superior weaponry to beat him."

The commander paused for a moment. He looked into the faces of his soldiers. They all looked stern. The commander smiled. "We do however, have an edge. The computer in these things," he said patting the front slope of his tank, "will allow us to strike and react so quickly the enemy won't know his head from his hiney." The soldiers gave a quick laugh which helped to break the tension.

"Now, you know the plan," he continued, "move separately, fight together. Stick with it and we will win. If there are no questions, get to your tanks and good hunting."

The preliminary battle went more or less according to plan. The company, fighting dispersed, was able to destroy most of the enemy's recon. The enemy, spotting tanks in groups of two or less, never got a good idea of the company's positions. When the enemy's main body approached, it was met with fires that seemed to come from a multitude of directions, all expertly coordinated. Indirect fires were falling on the enemy's formations. No matter where they turned, the fires were immediately adjusted onto them.

The fight was quickly over. CPT Steiner saw almost 30 vehicles burning in front of his position. On his display, he quickly called up his logistics screens. Ammo and fuel were low for each vehicle, but he could see that there was enough for another fight. The problem was that two tanks were not reporting. CPT Steiner tried calling over voice and discovered that while one vehicle had been destroyed, the other tank had been hit but was still operational with just the logistical portion of its computer malfunctioning. CPT Steiner made the correction to his status and it was automatically relayed higher.

"Alpha 6, this is Hotel 6," the net crackled. Bulldog was overrun. Follow-on enemy elements are entering his sector. I need you to counterattack into their flank. Sending graphics and frago."

CPT Steiner quickly cleared his display and called up the new graphics. He added some control measures of his own. With a "sending frago," he sent them to his subordinates. He gave them a minute to post them, and digest the information, and for the platoon leaders to further modify the graphics to fit their needs. The WILCOs appearing on his screen showed him that all of his elements had received and understood the mission. "Since there are no questions, execute now." Less than three minutes had elapsed since CPT Steiner had received the graphics and the counterattack was under way.

A few minutes later, his radio came to life. "Alpha 6, Red 1. It looks as if the enemy was expecting this. There is what looks like a FASCAM minefield across the route. Sending."

A minefield symbol appeared on Steiner's display. From the map on the display it appeared to be blocking the entire valley that Alpha Company needed for its counterattack.

"Alpha 6, Blue 4. Have spotted bypass. Suggest we change the attack plan as follows. Sending." CPT Steiner added the changes to the graphics to his display. He studied them a moment.

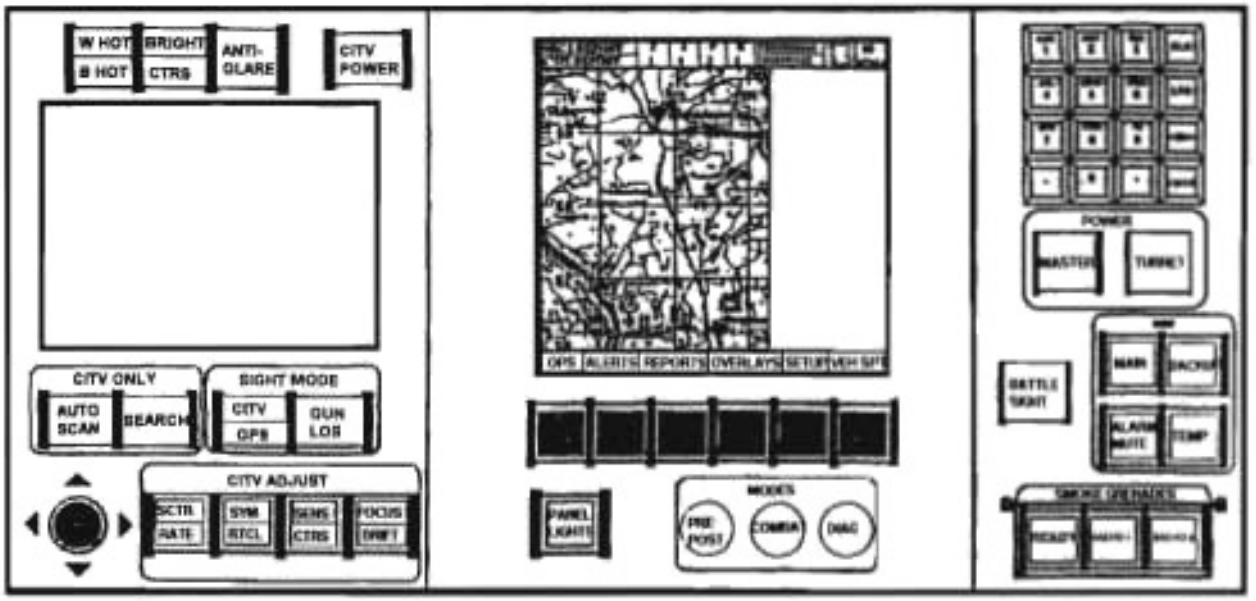
"Roger, I agree. Sending." With a push of the thumb switch CPT Steiner sent the changed graphic to higher and lower units. "Execute now."

The counterattack hit the enemy in what was thought to be a secured flank. Alpha Company quickly destroyed the enemy's thrust. Looking at the corner on his display, Steiner noticed that less than two hours had passed. It felt like a lifetime. Just then, the 1SG pulled up with the LOGPAC. It included exactly enough ammo, fuel, and personnel to bring the company up to 100 percent.

As the crew of A66 uploaded with ammo, the radio came alive. "Alpha 6, Hotel 6. Frago follows. Sending."

"Here we go," Steiner thought to himself.

The above scenario describes some of the ways that the Combat Vehicle Command and Control (CVC^2) system could be used in future combat. The CVC^2 is the second-generation computer system designed for use in the M1A2. While tank technology has made dramatic bounds since World War II, there had been almost no improvements in command and control

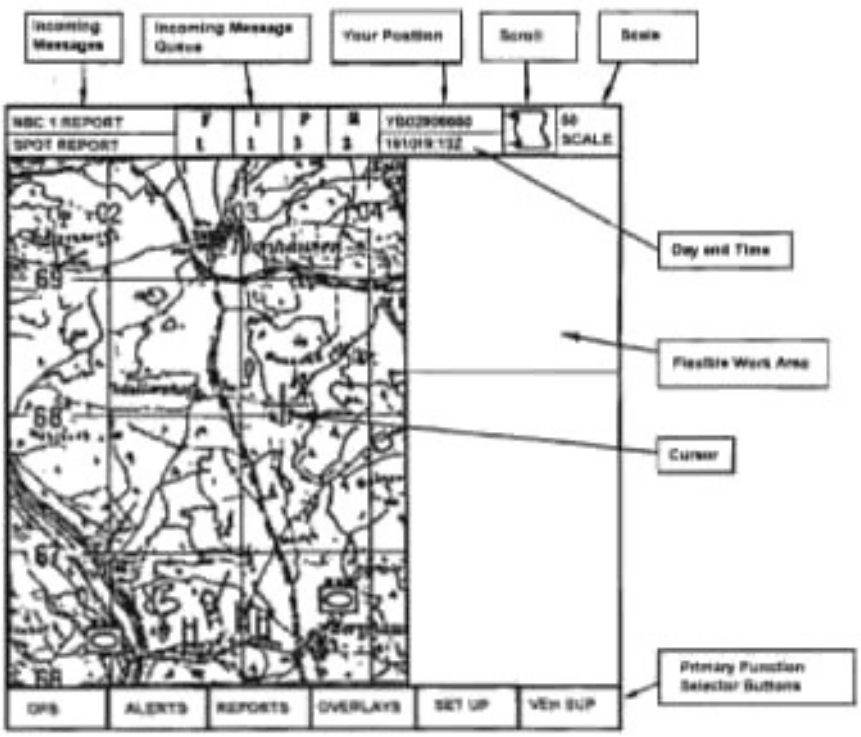


Above, display panel and controls of one of the CVC^2 systems now under development as a follow-on to the Intervehiclar Information System (IVIS). Illustration at lower left is a close-up of the touch screen and the functions it displays.

(C^2) techniques. At almost all battalion-level units and below, information is still being passed in person or over voice radio, while paper maps and acetate overlays are still used for planning and fighting a battle. CVC^2 is an attempt to advance C^2 into the computer age.

CVC^2 is an advancement of the Intervehicular Information System (IVIS) being used in the M1A2 today. The hardware changes in the system include modifying the Commander's Integrated Display (CID) to have a color tactical display with an infrared touch panel and interactive color map. Added is an electronic mass memory storage device which stores map data. The maps may be changed by changing disks in the unit whenever the vehicle is deployed.

Software changes provide an improved display format, a greater variety of reports, and automatic reporting. Many of these reports, both tactical and logistical, will be sent whenever the main gun is fired.



The CVC^2 system is part of the Battalion and Below Command and Control (B^2C^2) system which will include integration with the M2 Bradley Fighting Vehicle and other battalion-level vehicles. Also, the CVC^2 is interoperable with the system being developed for the German Leopard 2 Plus. Future developments include integration with the LONGBOW being developed for the AH64 Apache.

The CVC^2 display allows the commander a bird's-eye view of the battlefield. It allows him to tailor the map to his specific area of interest or operations. The screen will also show his own vehicle's location and the location of all friendly vehicles. The display also shows any incoming messages, a queue of those messages, the tank's own eight-digit grid, date-time group, and map scale. The display also has a flexible work area, cursor, and primary function select button names.

CVC^2 has three modes of operation: pre/post combat, combat, and diagnostics. In the pre/post combat mode, CVC^2 is used to create, send and receive orders, alerts, reports, tactical

map overlays, and perform various vehicle support functions.

There are six buttons below the touch panel that select the primary functions:

OPS - There are four items in the Ops function - Warning Order, Frago, Call for Fire, and Call for CAS. WILCO will light when your subordinates receive and confirm orders.

ALERTS - The Alert functions include NBC, MOPP Status, and Redcon.

REPORTS - The reports available are contact, spot, sitrep, NBC, tactical, logistics, route, bridge, shell, obstacle, and minefield laying.

OVERLAYS - The overlay function is used to view and edit map overlays. Free draw capability allows original overlays to be developed.

SET UP - The set-up function is used to set the initial values in various tank systems, such as SINGARS and POS/NAV. It is also used to set and send waypoints.

VEH SUP - The Vehicle Support function performs backup and checks the vehicle's functions.

In combat mode, the CVC^2 is used to create, send, and receive fragmentary orders (Fragos), alerts, fire support coordination, tactical map overlays, contact reports, and spot reports. It also performs the same vehicle support functions. The combat mode includes only those items deemed critical to combat. The functions in combat mode are just slimmed-down versions of those in the pre/post combat mode.

The diagnostic functions are identical to those in the M1A2 IVIS system. These are used to detect and isolate failures in the system. It is like an internal STA-M1.

The only drawback to the CVC^2 is that it is too efficient. It allows higher commanders too much detailed information. Higher commanders may find themselves suffering from information overload, inhibiting their ability to make a decision. The opposite side of the coin is that the higher commanders may be tempted to use the power of the system to act as a Vietnam-era eye-in-the-sky, micromanaging platoon and smaller-sized elements. These are problems to be addressed through training and doctrine, rather than changes in the CVC^2 system.

Victory depends upon effective command and control during the chaos of battle. Amid the ever-increasing tempo of modern combat, the commander is faced with the difficult task of keeping up with changing events and quickly organizing his unit to make a decisive response. With the proliferation of modern weaponry, we can no longer rely upon 50-year-old command and control techniques to provide victory. CVC^2 is a possible solution to this problem. By allowing near-real-time accurate information flow, it enables the commander to make rapid and timely decisions. This may be the edge needed to separate victory from defeat.

Editor's Note: Several teams are currently working on development of the CVC^2 system. CPT Schneider's article is based on his work with the CECOM version of CVC^2, which may differ slightly from other versions under development.

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The Decisive Point

(Continued from Page 39)

fact, after thorough analysis, the commander and his staff might find validity in multiple possible decisive points of varying descriptions. All these points may be important to the mission and therefore the unit should address them in the scheme of maneuver. However, the commander must select **one** as the **decisive** point to provide focus for the unit's planning, preparation, and execution.

Liddell Hart, in his 1944 work, *Thoughts on War,* states:

> *"The principles of war could, for brevity, be condensed into a single word: 'Concentration.' "*[5]

Concentration indeed, but where? Intuitively, commanders know that concentration at the right place is fundamental to successful combat. A commander must begin to concentrate his unit toward that "right place" early in the tactical decision-making process. His designation of the decisive point for each mission will provide the necessary focus at the beginning of the planning process and provide the "place" for the application of the unit's combat power.

Notes

[1]FM 100-5, *Operations,* 14 June 1993, p. 6-7, 6-8.

[2]FM 7-10, *The Infantry Rifle Company,* 14 December 1990, p. 2-19, 2-24.

[3]FM 71-2, *The Tank and Mechanized Infantry Battalion Task Force,* 27 September 1988, p. 3-25.

[4]FM 100-5, p. 2-4.

[5]Liddell Hart, Sir Basil, *Thoughts on War,* 1944, as quoted in *Dictionary of Military and Naval Quotations,* United States Naval Institute, Annapolis, Maryland, 1966, Robert Debs Heinl, editor.

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Leader Development — Don't Forget CSS

by Lieutenant Colonel Murray Williams

CSS is combat power. Be sure your leader development effort includes working through the details of CSS. All too often, CSS is substandard because leaders and/or soldiers simply do not know the right way to do it. Here's a suggestion on one way to improve leader knowledge, which in turn will improve soldier knowledge of CSS.

Develop battalion leaders during the battalion's maintenance day. For example:

0600	PT
0830	Bn Maintenance Formation (Bn Cdr marches entire battalion to the motor pool)
0845	OPD
1000	Bn Cdr with Co Cdr's inspection
1330	Battalion random vehicle inspection

The 0830 formation called by the battalion commander sends the message that maintenance is important and that it needs to be done routinely and systematically to be effective. The formation allows the commander to discuss points of emphasis during maintenance day, for example, cold weather checks.

The 0845 OPD subjects are published with quarterly training guidance. This requires planning ahead, which allows for adequate instruction notification and preparation. Some examples would be BFV PMCS checks (have a contact team chief, BMT or BMS give the class); tank PMCS checks (useful for infantry leaders during task organization with tanks); TAMMS (so platoon leaders will understand the system and know what to check); NVGs (have the DS maintenance expert explain the problems he sees and how to prevent them); small arms maintenance (have a sharp NCO and armorer go over what to check, how to check, how often, common problems, and how to prevent); billets maintenance (have the S4 and CSM discuss the standards and where to go for help); LOGPAC operations (have the support platoon leader teach); casualty evacuation (have the S1 and medical platoon leader teach); or battle recovery of vehicles (have the BMO teach). There are thousands of other appropriate topics. Tailor the classes to unit needs. It is useful to ask the lieutenants and company commanders what they'd like to have classes on. For example, if your unit is buying an excessive number of batteries, have a class on proper care and maintenance of batteries. One of the biggest problems with maintenance is lack of knowledge. This OPD program directly addresses that challenge and has a tremendous "trickle-down" effect. The lieutenants leave the OPD and check what you taught, then teach their soldiers.

The 1000 hour commander's inspection inspects areas of command interest. The number of items checked is six or less so it's manageable. The items to be inspected are published well in advance with the quarterly training guidance. This amounts to an open book test. Commanders can precheck well in advance. The battalion commander does the inspecting, accompanied by all company commanders, the battalion XO, BMO, and technical experts as required. The entire group stays together the entire time, so while the battalion commander is inspecting B Company's track line, the E Company commander cannot go looking after something else. The reason for this is that, inevitably, many other "commander's maintenance" questions come up. With the whole group there, a decision can be made and problems solved. Have the BMO be the recorder and capture what is discussed. Examples of items to be inspected include antifreeze protection, windshields, shackles, water trailers, batteries, gunnery flags, CVs, TRP kits, track wear, bumper numbers, M16s, PVS-7s, dayrooms, breaching kits, billet rooms, and there are many others. Don't restrict yourself to the motor pool; check out everything in the battalion that is CSS related.

The 1330 hour random vehicle inspection is conducted by the BMO and company XOs. Immediately following the 0845 OPD each company XO gives the BMO a list of all FMC vehicles in the motor pool (this ensures you do not pick a vehicle that is out on a mission). The BMO then picks four bumper numbers of like type vehicles. In a Bradley battalion, the vehicles inspected are usually Bradleys, but occasionally inspect other type vehicles (don't forget trailers). The inspection should be done by a team of mechanics picked by the BMO from company contact teams. The vehicles should come to a designated location with driver, BC, and a copy of the 2404 the crew completed that morning. The mechanics then inspect the vehicle and compare the results to the crew's 2404. The results should be go/no-go with no-gos given for major deficiencies like failing to identify a deadline fault. Come up with a score sheet in advance. Track the results over time and discuss with commanders at the monthly command and staff meeting.

Poor CSS performance is frequently the result of a lack of knowledge on the part of the leader and/or soldier. This program is one way of tackling the leader development problem.

Lieutenant Colonel Murray Williams is currently attending the U.S. Army War College at Carlisle Barracks, Pa. He recently commanded 4/16 Cavalry at the Armor School, where he was responsible for the Armor Pre-Command Course. His previous assignments include battalion command in 3d Battalion, 41st Infantry, redesignated 1st Battalion, 9th Cavalry, 1st Cavalry Division, Ft. Hood, Texas, and battalion XO, 1st Battalion, 18th Infantry, 197th Infantry Brigade (M)(S).

Setting the Stage for Success

by Lieutenant Colonel G.C. Harris

Success at a Combat Training Center (CTC) is truly a matter of perspective. To some leaders, success is confirming a home station training plan. To others, it is providing a training opportunity for a newly realigned chain of command. And to the individual soldier and his first line supervisor, success is very simple — beating the OPFOR. Against a professional, seasoned OPFOR, we all know this is a tough challenge. However, some units consistently perform well on all missions at the CTC. Their missions have no glamourous concepts of operations nor special effects to confuse the OPFOR. Their plans are simple and demand precise execution of the basics — gunnery, navigation, overwatch, and massed fires. The foundation these commanders build to achieve this success deserves examination.

Scores of CALL bulletins, professional journals, and field manuals document the tactics, techniques, and procedures of how to succeed. Commanders must rate and apply these insights to their particular unit. Most leaders accept the challenge and integrate documented lessons-learned into home station training.

However, there are other requirements that set a unit up for success. Commanders provide a critical battle focus. This is the intangible understanding and discipline that subordinate leaders and their soldiers apply to preparing and executing battle. This focus breeds success in the mind of the soldier and then on the battlefield. Specifically, the battle focus should:

- Demand thorough application of the troop-leading procedures.
- Specify the decisive point for the mission and how each unit supports that end.
- Train a common vision for warfighting.

There is nothing unique about these tasks. They do not guarantee the defeat of the OPFOR. However, they set a sound foundation for efficient planning and operations. Successful units routinely perform all three of these tasks very well. However, all too often, it is not the case. When the OPFOR successfully accomplishes its mission, one or more of these three tasks was absent from the commander's battle focus.

Troop Leading Procedures

The eight-step troop-leading procedure is doctrine. It hangs on the walls of most operations centers. Leaders do not enforce the procedure. Most units do not have a rehearsed drill for OPORD development. It is executed differently each time. It should be refined to a science at home station. Incomplete orders, inefficient time management, and impromptu shortcuts typically erode the process at the CTC.

Warning orders, issued sequentially as the mission analysis process proceeds, assure parallel orders development at lower levels. Warning order development and transmittal (verbal and hard copy) must be a drill. A recommended sequence is:

- WARNORD 1 on receipt of mission.
- WARNORD 2 on receipt of initial planning guidance from the commander.
- WARNORD 3 after course-of-action decision.

Once this guidance is given to companies, platoon leaders and below can focus supply preparations, conduct drill rehearsals, and complete pre-combat inspections. Individual soldiers can now prepare. They are usually the last checked, if at all. Their immediate leaders only need overlays, the final plan, and a mission rehearsal to now complete preparations.

Leaders must ruthlessly manage time. Make the schedule and abide by it. Adjusted meeting times and lengthy meetings erode preparation as the effect ripples down the chain of command. First-line supervisors and their soldiers, who must prepare to fight, are the real bill-payers. Leaders must block their third of the available time. This must include the time for rehearsals and back-briefs. The procedures for these two tasks — rehearsal and back-briefs — must be a drill. They usually digress to open-ended discussions and wargames that prove of little value as mission execution unfolds.

Simulations provide excellent training opportunities for most troop leading procedures (and OPORD drills). However, taking impromptu shortcuts at the Combat Training Center, such as using 'canned' plans from home station to do things faster, only hurts.

The staff robs itself of a valuable training opportunity and usually overlooks critical implied tasks and limitations.

JANUS and BBS simulation are superb training aids to refine procedures and wargame concept options. They are not CTC mission orders, ready for execution. The staff should instead document the internal procedures they use to develop the OPORD. The insights garnered through simulation in developing force array and targeting complement OPORD development and execution efficiency. Once in the maneuver 'box' at the CTC though, discipline the use of troop-leading procedures. Complete the mission analysis, albeit compressed. Train "what right looks like. Discipline the WARNORD and OPORD process and adhere to your time schedule. A disciplined process at battalion-level becomes the standard for company and below.

Decisive Point

The commander must specify the decisive point — that place or event where the main effort and all its contributors must achieve success. Whether wargamed in the mind of the commander or provided by his staff, the commander must decide. The decision is usually delayed, then gets lost in the myriad of current events as the mission unfolds.

Anticipative planning and shaping the battlefield remain basic to our doctrine. This is a measured decision of where and how to accept risk. Too many units try to 'sort it out on the fly,' both when and where to take risk and the place and means to achieve success. The result is that obstacles do not reinforce the terrain, fires (direct and indirect) do not complement the obstacles, and maneuver cannot exploit the success of fires. Achieving success at the decisive point must be the focus for planning and executing the operation.

While there is military art to planning, laws of physics and science directly affect the tempo of the fight. The plan must consider attack rates, obstacle resources (time, personnel, and materiel), and times to call, adjust and complete the fire mission at the decisive point. The plan will not achieve success at the decisive point if it is infeasible to synchronize the combat functions the commander envisions. Violent execution and superb soldiering cannot always overcome inadequate synchronization planning. With the decisive point and the method to achieve it clearly articulated, subordinates can help focus combat power to achieve the commander's endstate.

Warfighting Vision

The art of warfighting involves a common vision of the battlefield. The commander must personally communicate it to his subordinates. It addresses what success should look like and how the unit will achieve it. The written commander's intent articulates the purpose, method, and endstate for the mission. Many commanders' intents are incomplete. Hyperbole and fluff usually fill the commander's intent. It includes superfluous phrases like: aggressively recon or quickly reestablish contact. The intent should clearly describe:

- The decisive point, in terms of time, event, or space.
- What the unit should achieve there.
- How the unit's combat functions support that end.
- Where risk will be taken, in terms of units or location.
- The endstate.

The intent is not the concept of operations which, based on the battlefield framework, describes the form and concept of maneuver. The intent may also specify where he is willing to accept risk, and what he sees as key terrain. The commander's intent for the mission is critical, but there is more. The commander must teach his subordinates — personally — how he expects the unit to fight. There is no time for a tutorial on the radio once in contact. Leader development programs led by the commander lay the groundwork. The overhead is simple: chalkboards or 'duck-walks' with model vehicles and their leaders on a gym floor. Many soldiers, not to mention leaders, have never seen their whole unit portrayed to scale in formation as it executes a drill or play. This picture, narrated by the commander, becomes indelibly etched in the mind of the leaders. The commander must mold the vision for battle. It takes time, but it is an investment with an immense return.

Boldness and tenacity are reinforced by soldier and leader confidence in themselves and in their unit. Communicating the vision requires conscious preparation. The vision must be in place throughout the unit before arrival at the CTC. The Combat Training Center experience is the Super Bowl of training opportunities. The training objective should focus on refining the vision, not developing it.

The warrior spirit is alive in our Army today. Our ranks swell with superb soldiers. Leaders must mold them with a common vision of task and purpose. Key parts of this vision include: disciplined troop-leading procedures (from mission analysis to OPORD development drills), specifying the decisive point for battle, and training a common vision of warfighting. The result is confident leaders unafraid to make bold decisions that invariably lead to success — at the CTC or on the battlefield.

Lieutenant Colonel G.C. Harris is currently a senior task force observer/controller at the Combat Maneuver Training Center, Hohenfels, Germany. He received his commission from the U.S. Military Academy in 1975. His previous assignments include rifle platoon leader, support platoon leader, rifle company XO, and battalion S1 with 2-60 Infantry (M), Ft. Lewis; battalion S4 and mech company commander, 2-21 Infantry (M), Ft. Stewart, Ga.; chief, Theater C2 Systems, CACDA-C3I, Ft. Leavenworth; G3 Training Resources, 1AD, Ansbach, Germany; S3, 3d Bde, 1AD, Bamberg, Germany (DESERT SHIELD/STORM); and Commander, 1-30 Infantry (M), Erlangen, Germany. He has attended Naval Postgraduate School and MS Info Systems Technology School.

Under Armor Auxiliary Power Unit

by Staff Sergeant Robert Bialczak (MWBL) and Lieutenant Colonel Jackie Hamilton (TECO)

In May of 1993, the Mounted Warfighting Battlespace Lab (MWBL), Fort Knox, Ky., at the direction of then U.S. Army Armor Center Commander, Major General Paul Funk, led a coordinated effort to determine the levels of technology available to produce an under armor auxiliary power unit (UAAPU), conduct a field demonstration of that technology, and report on the results. The intent of the project was to determine if there could be any value in integrating UAAPU into the mounted force.

The M1 Abrams force is not equipped with auxiliary power units. When the vehicle is at rest, such as in defensive positions, the main engine is normally shut down while the electrical systems must remain in a power-up state, and the only source for this power is the vehicle batteries. Since the electrical systems will drain batteries quickly, thus endangering crews by failing to achieve main engine start and power loss, there is a strong need for on-board power generation.

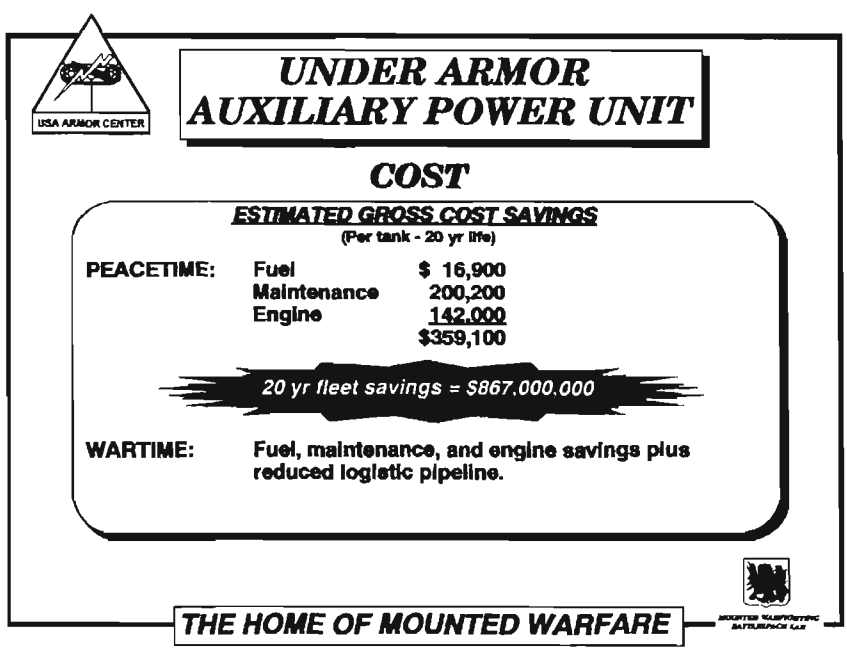
The MWBL sent out an initial request for information to the civilian business community in June 1993 to canvass for their input on UAAPU technology. Four industries have since invested time, effort, and financial resources, each producing a UAAPU prototype for demonstration.

The basic decision (made early in the program) regarding integration was that various corporations would be offered the opportunity to place their UAAPUs in the chassis of demonstration M1A1s, and government offices (Test and Evaluation Coordination Office (TECO), Ft. Knox and PM-Abrams) would design and approve the interfaces of those systems into the vehicle. Three ideals guided this government integration:

- All integrations would be similar to the maximum extent possible. This meant that such things as fuel supply would be from the vehicle's rear fuel tanks, bleed air would be introduced to the NBC system through the existing ducting, etc.

- The integration would utilize existing MILSTANDARD materials to the maximum extent possible, and specifically items which were already installed on the M1A1 tank. This was successful to the extent that only four items are not part of the tank — NICAD batteries, NICAD battery connectors (both of which are on all Army and other types of aircraft), the fuel meters which gather data on consumption and the flexible metal tubing utilized to duct bleed air to the NBC system. Such items as fuel lines and wiring harnesses are constructed of the same materials and in the same manner as those on the engine of the M1A1.

- The integration would not intrude into the operating envelope of the system. This means that all power into the vehicle from batteries and UAAPU would be through the existing battery negative and positive buss bars. This meant that the existing charging system regulators and safety features continue to be utilized. All signals to control the UAAPUs were taken from the test jack (TJ) on the hull network box. Due the configuration of U.S. Army test equipment (STE-ICE and DSETS), test jacks are included on major network boxes. When a signal is generated inside a network box to do something ("turn on NBC," etc.) that signal goes to two jacks, the one



connected to the components concerned and to the test jack. In this manner, all signals necessary to interface the controls of the UAAPU were obtained with no changes to internal operations or configurations of network boxes or software.

With the above considerations in mind, the specific interface requirements for the government equipment to each UAAPU (electrical connectors, fuel connectors, etc.) were approved and published to the UAAPU demonstrations. Each demonstrator provided drawings of modifications needed to the vehicle chassis to TECO which recommended adoption, possible re-design, or non-adoption to PM-Abrams. PM-Abrams was the final approval/disapproval authority for these modifications. Upon approval, the modifications were taken to Directorate of Logistics, Ft. Knox, for fabrication on the vehicle. A major portion of this integration effort is to install the following instrumentation:

- Fuel Consumption Meters - Meters were installed on both the main engine and the UAAPUs for the purpose of capturing specific fuel consumption. These meters measure consumption and not rate.
- Master Battery Hour Meters - These meters measure total hours the vehicle electrical system is in operation.
- UAAPU Hour Meters - These meters measure total operational hours for the UAAPUs.

Two additional meters already organic to the system will be recording main engine run hours (hull network box meter) and kilometers driven (odometer). Additional meters (main engine fuel and master battery hour meters) will be installed on baseline tanks not equipped with UAAPU, but participating in the same training exercises. With these data points, a fairly accurate mission profile of these systems (in a training base environment) will be documented. Additional data to be gathered periodically:

- UAAPU running noise.
- UAAPU and main engine charging rates in volts DC, amperes and "online noise" through kilohertz measurements.
- Temperatures in UAAPU compartment and supporting structures.
- Start curves of volts, amperes and kilohertz for UAAPU and main engine.

These data points, when combined with MANPRINT data points and thermal/noise signature recording, will provide a very comprehensive profile of the operation of UAAPUs, versus use of the main engine as a battery charger.

Currently, the MWBL is looking to continue experimentation with the UAAPU application to the combined arms digitized force, thus allowing the entire force the same advantages as so far seen by the M1 Abrams. To this end, a Combined Arms Under Armor Auxiliary Power Unit Conference was held at Fort Knox in March 1994. Attending this conference were representatives from the other battle labs, CASCOM, TARDEC, and program managers from various mobile platforms. This meeting resulted in commitment from all offices to work together to obtain a combined arms under armor auxiliary power unit.

The key to the program is simple: Total digitization cannot be achieved without vehicle on board power generation. Through the initiative taken by the Mounted Warfighting Battlespace Lab, this goal will be met in the near future.

The TRADOC System Manager for the AGS Comments on "The AGS in Low-Intensity Conflict"

In response to Captain Womack's article on the XM8 Armored Gun System (AGS) in Low-Intensity Conflicts (Mar-Apr 94), I would like to clarify the philosophy behind the design of the AGS.

The XM8 AGS was designed to be significantly more lethal, sustainable, survivable, and maintainable than the M551A1 Sheridan. Our primary requirement influencing all of these designs was that of transportability. The AGS must be able to be deployed via USAF tactical and strategic lift aircraft (C130, C141, C17, C5A) using the same Low Velocity Air Drop and Roll-on/Roll-off equipment and techniques that are employed for the M551A1 Sheridan.

This transportability requirement placed very severe constraints on the overall size, and more importantly, the weight of the base AGS vehicle. Within this weight/size constraint, it was just not possible to incorporate the Commander's Independent Thermal Viewer. Other items that were considered for the AGS but deleted because of weight were an auxiliary power unit, an integral bustle rack, and an individual vehicle tow bar.

As currently configured, the AGS does incorporate a 12-round per minute autoloader, three levels of modular armor designed to meet a variety of threats, dual net communication capability, an external phone for the infantry, a digitized fire control computer storing ballistic solutions for the entire family of 105-mm tank ammunition, a 1553 data bus, and an engine that, in addition to being able to operate on a wide range of diesel-type fuels, can be rolled out of the hull for maintenance in under 10 minutes.

Although the AGS doesn't have all the "bells and whistles" we would like it to have, it will provide the Army's early entry forces with significant firepower and crew protection within a system package that is easily deployable, maintainable, and sustainable.

Charles F. Moler
Colonel, Armor
TRADOC System Manager
for the Armored Gun System
Ft. Knox, Kentucky

The first AGS has rolled out of the factory, one of six to be built for further testing by the Army. See back cover. — Ed.

What is a Tanker?

by Lieutenant Colonel Steve E. Dietrich

Like any self-respecting Armor officer, I call myself a "tanker." But my boss, a widely published author at the U.S. Army Center of Military History, challenged my use in an article of the term "tankers."

"Some who read your work," he argued, "might think that a 'tanker' is a vessel that hauls bulk petroleum. Use simple English and not jargon. If by 'tanker' you really mean soldiers who fight in tanks, call them 'armor crewmen'."

I described this incident to Dr. Dale Prentiss, command historian at the Tank-Automotive Command at Warren, Michigan, and Mr. Tom Kornacki, who were preparing to interview retiring Major General Peter M. McVey. General McVey was nearing the end of a distinguished career in Armor that began as a platoon leader in the 5th Cavalry in Korea in 1958. McVey commanded armor and cavalry units at the company, battalion, and brigade levels. When not in units, he was often involved in the development and fielding of the Abrams tank. He was the chief of the Washington, D.C., office for the Abrams program manager during the tank's first fielding; as the chief of the XM1 new equipment transition training team, he trained the first battalion that received Abrams tanks. He later fielded the first Abrams tanks in Europe while serving as the initial chief of the materiel fielding team in Vilseck, Germany. His final assignment, lasting over six years, was as the first program executive officer for armored systems modernization.

Sgt. Hobart Drew, a tanker of the 37th Tank Battalion, 4th Armored Division, in a photo taken in 1944.

During the interview with Mr. Kornacki and Dr. Prentiss on 10 August 1993, General McVey repeatedly used the term "tanker." The interviewers recalled what my boss had said about the term and that I had described McVey's personality simply by observing that he was a typical "tanker." By the end of the session, Dr. Prentiss could restrain himself no longer — he had to have clarification. "General McVey," he asked, "what are the key characteristics of a tanker?" General McVey's response captured the essence of our being:

That's a tough question to answer. We tankers come in all varieties.

I started out as an infantryman myself, both enlisted and after going through officer candidate school. I liked the infantry. But I got assigned to Ft. Meade and started working with the 3d Armored Cavalry Regiment. I said: "Now, this is the way to travel." They had tanks, jeeps for scouts, armored mortars, and armored personnel carriers for infantry...the combined arms at platoon level.

The most important thing was that if I could figure out where I was, going at 25 miles an hour on a map — which took a little time for me, transitioning from walking, on a 1:25,000 map, to driving, on a 1:50,000 or 1:100,000 — the thing that I noticed is that, when I got where I was going, I wasn't tired, and I had a whole lot of firepower to make things happen.

I think what makes a good tanker is a guy who is interested in mechanics and automotives. He understands gunnery and likes to be able to shoot. He likes to get in and make things happen. He doesn't want to go into the fight unless he can knock you out.

It might be too harsh to say that you need a killer instinct. Maybe we're a little bit like bullies, too. We like to have the edge. We like to be able to know that when we arrive, we're going to be king of the hill.

I don't know how to characterize that. Armor guys will hurt you. I think they enjoy it. Armor guys will travel for hours and swallow dust, dirt, and grime, just to lay their sights on a target and shoot. They like to make a difference. You know that when they get there, they will make that difference.

You become very confident. I know very few tentative Armor officers. When you're wrapped around with 65 to 68 tons of steel and can go 35 miles an hour and you reach down there and punch one off and see something blow up that a couple of seconds ago was a major threat, you do get kind of cocky and confident. We'll hurt you.

Not everybody who wears Armor brass walks around beating his chest. But, in their hearts they know that they can be a terrible amount of punishment to you if they're in their tanks. So, we let them all run their mouths and we run our tanks. How do you characterize that? I don't know. But, I am glad I am one!

Lieutenant Colonel Steve E. Dietrich was commissioned in Armor from USMA in 1976. He is currently writing a book-length monograph on the M1A1 tank rollover program of Operation DESERT SHIELD/STORM that MG McVey oversaw.

Driver's Seat

(Continued from page 5)

SSG) and platoon sergeant (for SFC) are vital. If the noncommissioned officer has served in the key leadership positions and is a successful master gunner, then results of the previous promotion boards give definite proof that master gunners enjoy greater promotion potential. But repetitive master gunner assignments by themselves, regardless of how successful, are potential career stoppers.

The CY94 Master Sergeant and CY93 Sergeant First Class selection boards demonstrate the competitive advantage master gunners (both MOS 19D and MOS 19K) enjoy. Master gunners had a higher selection rate in both the primary and secondary zones than their non-master gunner peers. In addition, 66 percent of the secondary zone selectees on the CY93 Master Sergeant selection board were master gunners. Figures 1 and 2 illustrate this.

The perception that master gunners are not being promoted is obviously incorrect. While statistics cannot portray the complete picture, I believe they clearly show the advantage that master gunners have. As a rule, if you are successful in the key leadership assignments and you have demonstrated success as an armor master gunner, then your chances for promotion are greatly enhanced.

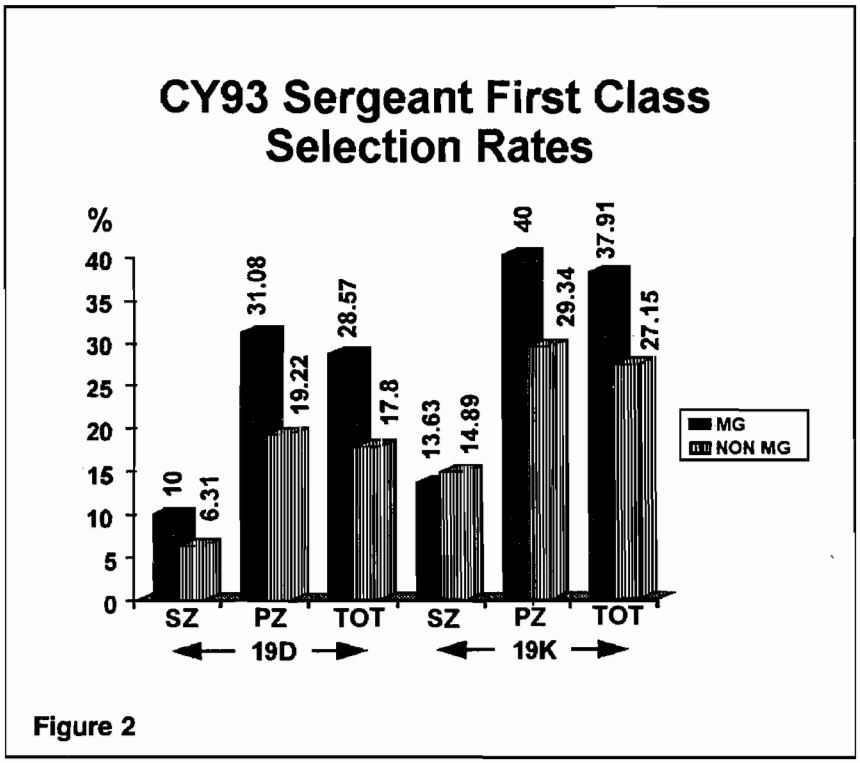


Figure 2

Because of the recent statistics favoring master gunners, this is not implying that becoming a drill sergeant or recruiter will not enhance your career.

Both are bonuses. However, I am trying to dispel a myth that is prevalent in the Armor Force. We still want soldiers to become master gunners because of the benefit they will continually provide.

As can be seen in Figure 3, the master gunner is versatile, and can be used in many areas of the Armor Force, from both leadership to functional assignments. Due to the importance of the master gunner, the leadership still needs to send the most qualified NCOs to the course. Armor NCOs should now realize that becoming a master gunner can have many rewards in their Army career.

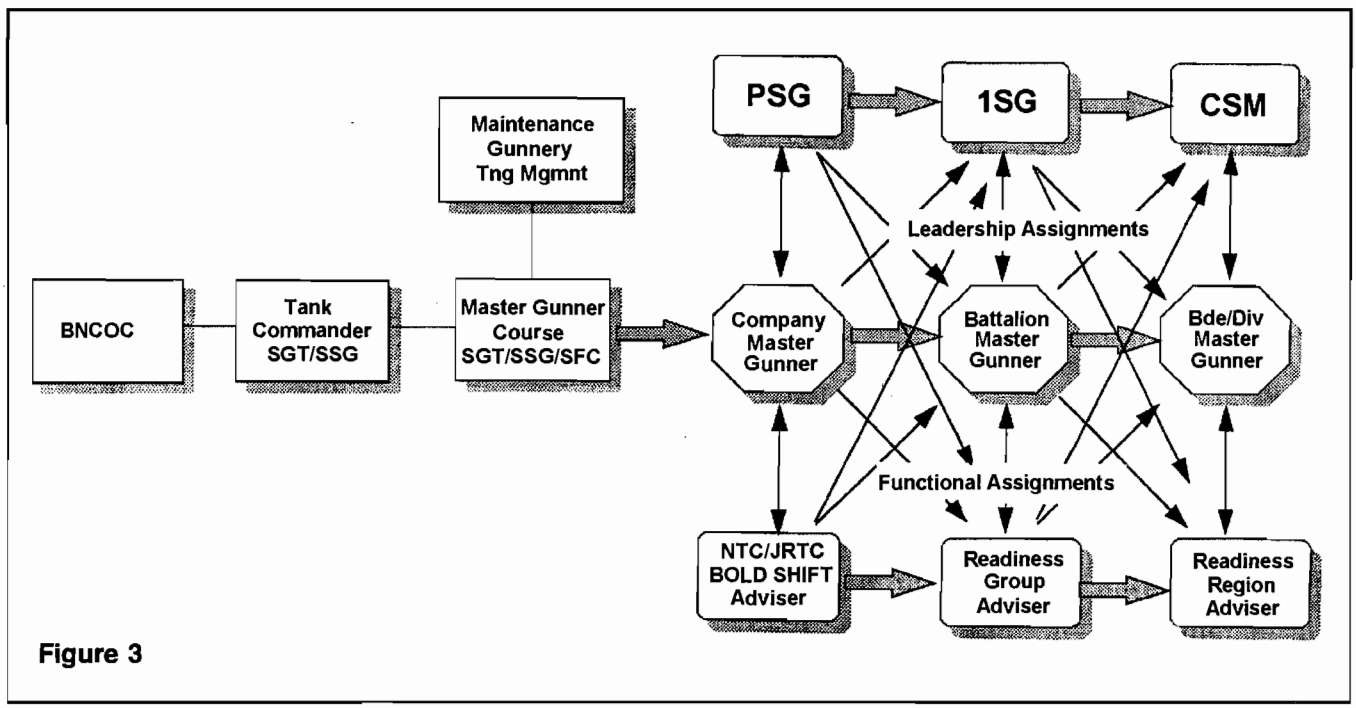


Figure 3

LETTERS (Continued from Page 3)

renewed Russian imperialism or a pan-African Islamic jihad, we'll have to be able to throw an armored thunderbolt directly from the U.S. into whatever nest of snakes is coiling around our external resources by destabilizing little nations. The trick is to have that weapon, already debugged and ready to go, when it is needed... We will have to be able to do it long before the AGS comes on line. We might even be needed this summer if the current news is a guide.

Prepositioned ships full of M1A1s are not the answer, as those ships are unarmored; and the Iranians and Iraqis are buying subs from Russia. Nor is the Abrams necessarily the proper weapon for the job. As Hal Spurgeon and Stanley Crist brought out in their *ARMOR* article, what is needed is a multi-role vehicle, not an MBT. An Abrams is not necessary to beat up a T-54 or BMP; and a perusal of *Janes* serves to locate most of the world's armored threats.

Most of Central Africa doesn't have a viable armored threat. What they do have is a drastic need for a small, fully balanced combined arms team to secure tribal battles which threaten to create famines and cut off vital mineral supplies. Now, how small can that team be, and how do we package it? How do we move it, and where do we get the hardware?

Can we put an ACAV M113, a platoon of light infantry, and a mortar section in a C-130 and throw it 2,000 miles? This is not a light force, nor a heavy one. I call it the Light/Heavy Force... And it can be built up as self-contained aircraft loads. Take a C-141B, for instance. That's 35 tons for 4,000 miles. We can put a pair of 113s in there, one with a 90-mm Cockerill gun and another with a 30-mm AAA turret.

Is there still room for the grunts? We've just used 24 tons, and a 180-pound trooper with 80 pounds of assorted gear adds up to 260 pounds. Which means that, minus any heavy weaponry, supplied by armor, 44 light infantrymen weigh just five and three quarter tons. The problem isn't weight, it's room. Can we get two platoons of infantry in there along with three mortar sections? A few planeloads like this, all trained and set up with TO&Es at Pope Air Force Base, or Frankfurt, ready to go, would be a viable instrument of national policy.

We could set up this postulated light/heavy force, lose it in the shuffle of downsizing, and train it at the NTC — while nobody is looking. Then it will be ready when needed, maybe in one month. We've already got the hardware; all we require is the computer time and the shakedown time in the field.

Sooner or later, the UN is going to call for another American intervention somewhere, and the best way to avoid any more debacles, like the ambush of Rangers in Somalia, is to have a small, tight, hot unit with imbedded light armor, air transportable and ready to go. I hate to say it, but we may have to sneak armor in like General Westmoreland did in Vietnam. But once the light armor is on the ground and working, I suspect all objections will vanish.

RALPH ZUMBRO
Ava, Mo.

The Tank Is NOT Dead

Dear Sir:

I must commend the writers of the article, "Armor in the 21st Century" (Jan-Feb 94). They have raised legitimate issues about the employment of armor. However, they have thrown out the baby with the bath water by saying the tank is dead. Their reasoning is based on the same short-sightedness that military planners used to take machine guns out of jet aircraft during Vietnam; a mistake that cost this nation dearly in highly trained, dedicated aviators. I strongly urge the writers to reconsider their position before they propagate such theories further, lest young American lives be needlessly wasted.

I read the article with an open mind. As I have worked as a tank officer attached to an infantry CO/TM, I embrace the idea of a combined arms tank capable of carrying an infantry fire team as part of the crew. This is one of my favorite features of the Israeli Merkava. This idea would be a throwback to the days of the cavalry and the mounted rifles.

I was shocked, however, to hear that helicopters and jets are replacing the tank, pushing it the way of the "horse cavalry." Aircraft have never, nor will they ever, be able to take and hold ground, much less do it as well as the tank (be it MBT, AGS, or CAT). The airplane and the helicopter are a very important part of the combined arms team, but to say they will replace the tank would be like saying that the tank will replace the infantry (a point many armor proponents proposed in the early part of this century). Not to mention the fact that even our state-of-the-art, all-weather attack aircraft are not all-weather. Who do you think the Iraqi tankers were surrendering to in those blinding sand storms while the aviators were back at the base waiting for better weather? As a wise battalion commander of mine once said, "Don't rely on... air support as the decisive factor in your battle plans as they will often let you down."

Ask any honest paratrooper about how glad he was to see the 24th Mech and the M1 tanks arrive, and he will tell you he breathed a great sigh of relief because he was no longer merely an air-droppable speed bump for the Iraqi Republican Guard. Had he any sense, Saddam would have sent an armored division or two into northern Saudi and sent the American protesters whining to Capitol Hill to pull us out yesterday. The military has recognized this fact and is pushing for air-transportable MBTs/AGSs/CATs, more heavy airlift assets, and prepositioned stocks afloat.

Agreed, tanks are vulnerable to aircraft. Need I remind you, however, that the predominant killer of OPFOR helicopters at the NTC and CMTC is the M1A1 MBT main gun. Tank crews practice shooting the HIND and the HAVOC in UCOFT and SIMNET all the time, and some of those gunners are good, too. While the .50 HB may not be effective against fast-movers, the Stinger missile system is. One or two Stingers in a tank platoon will do a lot to stem this shortcoming. If you do not agree, ask the Soviet aviators from Afghanistan (what's left of them). Gunner, Sabot, Chopper!

As for changing doctrine, don't believe for a moment that conventional warfare or the need for armor in low-intensity conflict and operations other than war has gone away. A conventional, "MBT-friendly" war is as close as tomorrow's headline. China has not thrown away their tanks. North Korea still wants reunification. Infantry and aircraft alone will not stop them from getting their wish. Russian hardliners and neo-fascist, are still a very real threat. Zhirinovsky's success in recent elections reminds me of another crackpot leader no one took seriously until he had embroiled the world in the Second World War. Peace in our time, eh, gentleman?

Our dedicated U.S. Rangers were slaughtered in the streets of Mogadishu by a bunch of malnourished, fourth-world thugs for lack of armor support to come to their rescue. There was plenty of time to deploy the M1A1 and the M2A2, but former Sec. Aspen refused the recommendations of his senior leaders (the same kind of shortsightedness MAJ Spurgeon and Mr. Crist propose). One must remember why the Rangers got stuck in the first place. Their helicopters were shot out of the sky by RPGs and small arms. Things got quiet after the tankers arrived. I don't think that BFVs and lightfighters are going to be able to enforce any UN mandates in Sarajevo on their own.

Every weapons system has its advantages and disadvantages. It is the appropriate mix that will provide victory. But to eliminate the tank, even the MBT, from the combined arms equation is tantamount to signing the death warrants of hundreds or even thousands of young American soldiers.

1LT JOHN S. WILSON
106th Finance Battalion
Germany

Tanks May Be Vulnerable, But Combined Arms Team Is Not

Dear Sir:

I want to reply to the Jan-Feb 94 article entitled "Armor in the 21st Century." Since the authors, MAJ Spurgeon and Stanley Crist, wrote the article with the object of exciting opinion in the Armor community (and the Army as a whole), I will take them up on the challenge.

The authors begin their thesis by trotting out the old red cape of "The tank is dead." They equate the tank with the horse, an anachronism on the modern and future battlefield. They predicate their argument, both in general and specifically, by citing the prevalence of PGMs (precision-guided munitions) and air power. These two weapons systems, the authors maintain, are today and tomorrow what the musket was to the mounted knight of yesterday — a grim equalizer that nullified the power of the mounted arm. I strenuously disagree with this comparison. I vehemently aver the utility and power of the MBT on the battlefield of tomorrow.

The authors, with some justice, point out that DESERT STORM was not the fullest measure of our mettle (no pun intended). We will never have another opportunity to so thoroughly trounce a foe. Saddam Hussein was indeed very generous to the U.S. and our Allies in allowing us the time to prepare for combat. No future enemy will be so lacking in resolution when it comes to blows. I have to agree with the authors that we cannot become complacent and continue to fight the last war, be it DESERT STORM or Vietnam.

I think what DESERT STORM, and history in general, has taught us is that no army can **kill its enemy** and **win** unless it fights as a **combined arms team**. Certainly any modern MBT is vulnerable to enemy air power. Certainly, any tank, including the M1, can be defeated by a (brave) infantryman armed with an ATGW. Certainly there are theaters of operation where lighter forces are more appropriate (Vietnam, for example). The M1A1 **does** look out of place in a peacekeeping/making operation (Somalia). And, of course, all Army leaders, officers and NCOs, must strive to enhance the all-arms integration of our service or we will die on the battlefield.

Yet I believe, and I think both Spurgeon and Crist would agree, that the all-arms force, including MBTs, **is** part of the wave of the future. The tank is but the iron fist in our arsenal. Armor, Infantry, Field and Air Defense Artillery, in tandem with Aviation and Engineers, supported by the Service Support Corps, is a war-winning combination for the next century. There are yet many places where tanks and mechanized infantry will be needed if a war ever arises — NW or Central Europe, Korea, North Africa, the veld of southern Africa, the oil-rich and strategically vital Middle East, and (God forbid) the Balkans and the Russian steppe. Certainly, what the Gulf War, as well as the earlier Arab-Israeli wars, taught us is that you **must** have tanks "at the sharp end" to confront the hordes of Soviet and Chinese tanks that we are likely to encounter. Ask any rifleman in the 82d Airborne if he wants to take on a T-55 or T-72 with just the handiest ATGW. I think not. What we must insist on in our Army is that we practice what the authors preach — an integrated all-arms force capable of overwhelming any foe we may encounter.

I see many faults as to the specifics of the authors' arguments. They say that the AGS is too light in armor to be really a survivable weapon. Fair enough. But the most important thing about the AGS is not so much the vehicle itself but what is inside it: the crew. I personally would bank my money on a well-trained American crew manning an AGS (armed with the proven, lethal 105mm) and taking on any Soviet-designed tank. The AGS is not perfect, but neither is the Bradley. The latter has to carry a lot of antiarmor armament to countervail its deficiency in armor. Yet the authors are asking the infantry to give up something that could only help the riflemen — direct fire support by a 105-mm gun against enemy **tanks**.

I have to agree with the authors when they write that tanks are vulnerable from the air. But that is only a truism dating at least as far back as the '30s.

I have to agree with the authors when they write that tanks are vulnerable from the air. But that is only a truism dating at least as far back as the '30s. The Germans defeated the Allies' air superiority and even tank superiority, in numbers and quality, in 1940 with better tactics, training, some audacity, and, yes, a little luck. No tank is impregnable versus aviation. Yet no plane or helicopter is safe while on the ground. An immobile tank may be just a million-dollar, overweight pillbox, but a grounded aircraft doesn't even rise to that dignity. If an aircraft is shot down, you lose the craft and very likely the aircrew, several million dollars in training and production down the drain.

A tank can operate in much worse weather than an aircraft, for a longer period, and the crew, at least in most Western tanks, can walk away and fight another day. We know that is true of the M1 series. In every war that the Israelis have fought, they proved the efficacy of tanks in difficult terrain and under severe travail. From the mountain passes of Sinai, to the Golan, to the crowded streets of the West Bank and in the hills around Jerusalem and in Lebanon, the Israeli Armored Corps, armed with an aging hodgepodge of tanks but superbly led and filled with brave, dedicated and trained soldiers, defeated its nation's enemies. They were also supported by field artillery and the IAF. No one in the U.S. Armored Force, I warrant, would really want to take on Israeli tankers in combat. Moreover, tanks were effective, albeit with some limitations, in such unfriendly places as Burma (British and Imperial tanks in WWII), Korea, and SE Asia (U.S., Australian, South and North Vietnamese). Tanks were helpful, if not always decisive, in these conflicts because they fought as part of the team.

Aircraft, on the other hand, need as much, if not more, maintenance and logistical support as a tank, yet for all its trouble, airpower alone has yet to decide a conflict on its own. Aircraft cannot fly in all weather. Aircraft, especially jets, cannot loiter over the battlefield for very long. And there continues to be nagging questions about the precision of so-called "smart weapons." And aircraft must still be defended by ground forces while on the ground. If the Gulf War taught us anything, then it is that the mechanized ground forces need the Air Force and Aviation as much as Aviation and the Air Force need tanks and infantry. One cannot go without the other in an all-arms team and fight to win.

I do agree that we should look into the possibility of a CAT (a combined arms tank) for our force. We know it is feasible; the Israelis proved it with the Merkava. Incidentally, I should note that, for a weapon designed to be used at least into the first decade of the 21st Century, the Merkava is a distinctly old-fashioned tank — it mounts the 105mm and is powered by a diesel engine which can hardly drive it over 30 mph. Yet none of us doubts it effectiveness. More to the authors' point, it is a good model for a CAT, being survivable and having a fire-team crew compartment to transport infantry straight into combat.

In sum, the authors have succeeded in their goal of exciting opinion on the Armor Force's future. They advance several ideas that are relevant to their thesis that the tank is obsolete. What they ignore (or appear to ignore) are the diverse geopolitical and strategic considerations that may bring Americans into harm's way. Once there, Americans of all four services will have to fight as a TEAM to be victorious. If one lesson has come down to us from 6,000 years of military history, it is that the Army that fights as a clenched first, with mounted arm — horse or tank — well to the fore, will win.

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BOOKS

With the French During DESERT STORM's "End Run"

100 Miles From Baghdad: With the French in Desert Storm, by James J. Cooke. Praeger Publishing Co., Westport, Conn. 1993. 256 pages. $45.00.

During the two decades prior to DESERT SHIELD/DESERT STORM, French and British power projection capabilities outside NATO remained limited. Both countries possessed forces to augment American deficiencies and to reach critical areas such as the Middle East in an emergency. James J. Cooke's *100 Miles to Baghdad,* is an account of one such force, France's elite *Division Daguet.* Cooke, a reserve lieutenant colonel, served as an intelligence officer with this division in Southwest Asia and provides valuable insights into the French Army's participation in DESERT SHIELD and DESERT STORM. Cooke's book is the first to examine the French Army in English since the publication of George A. Kelly's masterful book, *Lost Soldiers: The French Army and the Empire in Crisis* (1967). Kelly observed then that the French High Command converted the colonial army into "a small, highly mobile conventional force" following its disastrous performance during the Algerian campaign. This smaller unit, renamed the French Rapid Deployment Force (FAR), provided the nucleus for France's contribution to the Allied coalition arrayed against Iraq in September 1990. Colonel Cooke's *100 Miles to Baghdad,* building on Kelly's pessimistic analysis of the French Army in two colonial wars, indicates that the Gulf War became the means for "exorcising" the "ghosts" of Vietnam and Algeria from France's national psyche. Cooke, a French colonial historian at the University of Mississippi, uses both Vietnam and Algeria as the basis for analyzing the French Army in SWA. The author, likewise, stresses the extraordinary efforts on the part of the French and Americans to reforge the bonds of comradeship lost in the 1960s.

Cooke provides an excellent insight into the workings of an intelligence officer in combat. Trained as an Armor officer with the Mississippi National Guard, he offers an excellent overview of the U.S. Army's AirLand Battle and its impact on General Schwarzkopf's ground assault on Iraqi forces. The author reiterates British historian John Keegan's view that AirLand Battle, designed for the plains of central Germany, worked magnificently during DESERT STORM. Despite French assurances that they would indeed fight, U.S. and other coalition partners expressed concern as to whether *Daguet's* commanders would be willing to subordinate themselves to American command and control, as well as their ability to operate under a doctrine that emphasized speed and maneuver. General Schwarzkopf and other Allied leaders likewise expressed concern that France's maneuver warfare doctrine would conflict with that of the Americans. French maneuver warfare doctrine, as it turned out, was — much to everyone's surprise and relief — close to the concepts of AirLand Battle. This unity of doctrine enabled the French to integrate quickly the 6th Division's operational capabilities with those of the XVIII Airborne Corps.

Cooke likewise discusses another important element of integration that did not take place, and that, of course, was the call-up of the U.S. Army National Guard, an important element in the so-called round-out concept. Theoretically, at least, these round-out units, heralded as being an important component of AirLand Battle, were to mobilize and follow an assigned division to the crisis area. While many of the brigades trained on the same equipment as did Regular Army units at Fort Hood, Texas, and at the National Training Center, Fort Irwin, California, they were either left at the NTC or never called out. Cooke decries the decision not to use the round-out units as being both bad politics and a waste of money on the part of the Army.

Cooke, assigned to the XVIII Airborne Corps' headquarters as an intelligence officer, offers a clear insight into the early preparations for war when he was attached to the Royal Saudi Land Forces (RSLF), as both the G2 liaison officer and senior American officer headquartered at King Khalid Military City (KKMC). XVIII Corps GHQ then ordered him to report to the French 6th Armored Division, positioned on the western flank at Rafha'. The author, because of his command of the French language and knowledge of their history, then reported to *Division Daguet,* a unit comprised of Foreign Legionnaires, French Marines, Spahis, as well as the 6th *Division de Cavalerie,* all parts of the French Rapid Deployment Force. Cooke indicates that what made this assignment even more interesting was that these same units had historical links to the French armies that had conquered North Africa, as well as serving in Indochina and Algeria, and had a romantic yet troubled history.

Daguet's assignment was to prevent the 45th Iraqi Army from driving into Saudi Arabia, while at the same time preparing to join in the assault and seizure of As-Salman, 150 kilometers from the Saudi-Iraqi border. Cooke's mission, as well as that of his French counterpart, Lieutenant Colonel Michel Ostermann, was to collect sufficient information on the enemy divisions in and along the western side of the Wadi Al-Batin system. Cooke soon developed a harmonious working relationship with his counterpart, which greatly assisted in the collection and dissemination of timely intelligence prior to and during the ground war. The author provides an interesting insight into the French Army's methods of intelligence gathering, and its remarkable similarity to the American intelligence process, a factor that ensured *Daguet's* successful drive into Iraq. Cooke added that, while both the French and Americans were acutely aware of the mistrust that existed between the two former allies prior to the war, both sides went to extraordinary lengths to ensure the success of the coalition in defeating the Iraqis. Cooke makes particular mention of the fact that many American officials wondered if French troops would, in fact, participate in actual hostilities once the war began, due to the objection raised by French Defense Minister Jean-Pierre Chevenement. The French likewise expressed similar concerns over American resolve in removing Iraqi troops from Kuwait, fearing that the U.S. Congress would opt for a continuation of economic sanctions, as opposed to going to war. When it became apparent that both sides would indeed fight, nothing but harmony existed between the two armies during the entire length of the war, and afterwards. Despite the spirit of cooperation that existed between the U.S. Army and *Daguet,* it was, however, necessary at times to 'fine-tune' the relationship when misunderstandings did occur, in order to ensure that both sides were working toward the same goal.

Briefly Noted

Panzerheld: The Story of Hauptsturmfuhrer Michael Wittman, The Greatest Tank Commander of World War Two, which we reviewed in the March-April 1994 issue, is available through the author, Dr. Gregory Jones, 3704 Pontoon Rd., Granite City, IL 62040. You can contact him by phone at (618) 931-3368. The price is $22.95 plus $2.00 S&H.

D-DAY: June 6, 1944: The Climactic Battle of World War II by Stephen Ambrose (reviewed in our May-June 1994 issue) is now available on audio tape, read by the author. The four cassettes run a total of 6 hours and are available from Simon & Schuster for $25.00 (Ph: 212-698-7086).

Professor Cooke's book provides an excellent description of *Daguet's* preparations for the start of the ground war, or "G-Day." *Daguet,* assigned possibly the toughest mission of Schwarzkopf's "End Run," was to open up Main Supply Route (MSR) TEXAS, as well as to move into Iraq and seize As-Salman's critical road juncture and airfield. Selected by XVIII Airborne Corps, the Legionnaires, 3d Marines (French), and paratroopers of the 82d Airborne were to seize As-Salman, and establish a "blocking position" in order to prevent an Iraqi counterattack.

The 4th Dragoons, part of *Daguet* and also part of the French Rapid Deployment Force, trained to fight in a European scenario and was not accustomed to employing a large number of tanks (except perhaps in training exercises) in an operation the size of DESERT STORM. *Daguet,* like its American counterparts, took the opportunity prior to the commencement of the ground war to work on desert maintenance, desert tank gunnery, and maneuver techniques. When the war commenced, the 4th Dragoons, armed with AMX 30 medium tanks and Panhard armored cars, was to support the French 3d Marine Regiment, acting as *Daguet's* main maneuver element. Joining in the assault on As-Salman, through MSR ROCHAMBEAU, were elements of the 1st Spahi Regiment, the 2d Foreign Legion Infantry, and the 1st Foreign Legion Cavalry, all venerable units of France's colonial past and heirs of the French legacy in Indochina and Algeria. Accompanying the French were the 2d Brigade of the 82d Airborne Division, as well as the 18th Field Artillery Battery, equipped with newly-acquired multiple rocket launchers (MLRS). *Daguet,* comprising 12,000 officers and men, supported by French and American artillery and Gazelle and Puma helicopters, began the ground war moving into Iraq and securing the vital crossroads leading to As-Salman. It is at this point, however, that this book's major fault becomes apparent. That is, of course, the lack of pertinent chronological information, such as times and dates for the commencement of the war. While Cooke provides some chronological information, the reader is left guessing when and where the events he is describing took place.

Cooke's chapter on 'Fighting the Iraqis' is perhaps the single best chapter in the book. The author provides an excellent overview of the French drive to As-Salman and the lackluster Iraqi response to *Daguet's* presence on Iraqi soil. He provides a blow-by-blow account of the French drive toward the Euphrates River, and of beginnings of the so-called *Enemy-Prisoner-of-War Express* (EPW). *Daguet,* up against the Iraqi 45th Division, expected the Iraqis to make a fight for As-Salman. As *Daguet* advanced beyond As-Salman, however, the opposite occurred, with French and American units taking large numbers of Iraqi prisoners. Brigadier General Bernard Janvier, the French commander, instructed that they be immediately turned over to the Saudis, so as to avoid what both Cooke and Kelly call institutional atrocities by the victorious allies.

100 Miles From Baghdad, written by a trained historian and an active participant in the war, represents one of the best personal accounts of DESERT STORM and is one of the first personal accounts of the ground war from a non-American perspective. Professor Cooke's book, in addition to British historian Nigel Pearce's *The Shield and the Sabre* (1991), and Charles Allen's masterful account of the Royal Air Force in *Desert Storm, Thunder and Lightning* (1991), will remain as one of the best individual histories of a division at war for the foreseeable future.

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Fields of Armor, produced by Peter McKelvy. Discovery Communications, Inc., Indianapolis, Ind., 1993. Approx. 5 Hours, $59.95.

Fields of Armor is a four-cassette, 11-episode video series that chronicles the development of the tank from its humble origins on the battlefields of the First World War to the Allied triumph in the Gulf War. Individual episodes, each about 25 minutes long, cover the First World War, the interwar period and the 1940 Battle of France, El Alamein, Normandy, the Battle of the Bulge, Kursk, Korea, Vietnam, the October War, Afghanistan, and the Gulf War.

Many of the great tank battles of the 20th Century come alive from the perspective of the tank crew members themselves. These experiences range from the sheer terror of a Sherman crew facing a Tiger in the Ardennes to the adrenaline rush of an Abrams crew knocking out multiple T-72s in the Gulf. The Soviet experience in Afghanistan and the American experience in Vietnam, in turn, provide examples of the tank's limitations when opposed by guerrilla forces in unforgiving terrain.

The series draws upon rare and contemporary footage, still photos, diary accounts, and interviews with battle survivors and key officers. It also relies upon the insights of renowned historians such as John Keegan *(The Face of Battle),* Kenneth Macksey (Guderian), and Max Hastings (*Das Reich).* Because of its historical and technical accuracy and state-of-the-art production techniques, each episode is informative and captivating.

Fields of Armor would be an excellent audio-visual resource for an armor unit library or for an ROTC course focusing on 20th Century military history. Though expensive, the series would also be a welcome addition to the professional library of an armor/cavalry soldier.

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U.S. Military Tracked Vehicles by Fred W. Crismon. Motorbooks International, Osceola, Wis. 1992, $39.95.

Over the years a great many books have been published on the history of tanks or tracked vehicles. Many of the armor-related books scanned in a book store or library turn out to be a disappointment to a potential buyer. *U.S. Military Tracked Vehicles* by Fred W. Crismon is not one of those disappointing books. The book is one of the finest compendiums of information on tracked vehicles in U.S. service ever written.

The book opens with a quick survey on tracked vehicle development from before World War I through the M1A2. It also includes some very useful definitions of various tracked vehicle technical terms. The book is divided into sections that cover tanks, recovery vehicles, landing vehicles, and many more categories. Within each section, a complete description and photograph of each type of vehicle is arranged in chronological order. Sadly, the thickness of armor on armored vehicles is not given and neither is the armor penetration capability of the tank main gun. These are about the only shortcomings in the book, and it can be argued that such information lies beyond the scope that the author intended.

This book is a must-have for any one interested in the evolution of armor and is a should-have for most armor personnel who have to answer questions about U.S. armor. Some may complain about the cost but, compared to other books that attempt to cover as broad an area, it is a bargain. A current issue of *Jane's Armor and Artillery* costs well over $200. Other readers should find this book of use as well.

Anyone watching television news is familiar with the standard television shot during a coup or military deployment in an urban setting, where a tracked vehicle goes by and the correspondent calls an APC a tank. If CNN, ABC, NBC, and CBS would issue *U.S. Military Tracked Vehicles* to their correspondents, they would not only be able to do a better job of reporting, but they would enhance their credibility by properly identifying vehicles.

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AGS Rollout - The rollout ceremony for the new XM-8 Armored Gun System took place April 21 at the United Defense plant in San Jose, CA, where the vehicle will be built. The ceremony signified the presentation of the AGS to the Army for testing. Six preproduction vehicles will now undergo technical and operational evaluation, to include live-fire testing, until March 1997, when a final decision will be made on funding full-scale production.

Weighing only 19.5 tons in its base version, and deployable by aircraft as small as the C-130 Hercules, the AGS is designed to provide tank-killing firepower to light forces. There are plans to equip units such as the 82nd Airborne Division and the 2d Armored Cavalry Regiment with the AGS. A total of 237 vehicles may be built.

With a crew of three, the AGS has an automatic loader for its 105-mm main gun, allowing a rate of fire as high as 12 rounds per minute. Add-on armor packages can increase its protection when needed. Its 552-cubic-inch diesel, on a roll-out mount at the rear, is designed for easy crew servicing, as is the built-in diagnostic system.