ARMOR

Harmon

<u>50 Years Ago:</u>

The Normandy Campaign — A Missed Chance to End WWII (Books — Page 51)

First With The Most

During the last week of May 1944, the coast of southern England was aswarm with 1,627,000 American soldiers and 53,000 sailors, poised in what General Dwight D. Eisenhower called a "great human spring, coiled for the moment when its energy should be released and it would vault the English Channel in the greatest amphibious assault every assembled." What must it have been like for those troopers, knowing they stood on the threshold of such a mighty endeavor? Knowing that the fate of our generation rested so heavily upon their shoulders?

Where might the world be today without the bravery and sacrifice of those soldiers, both U.S. and Allies, on that blustery 6th day of June, 1944? Would Europe, Africa, and Asia have known freedom? Would European Jews have survived the atrocities of the death camps? Would fascism have been contained? Would American soil have become the next battleground?

Time often dulls the memory of great events the way frequent washing fades our favorite shirt. The luster disappears, the crispness goes away, and we start to take for granted the comfortable fit. Fifty years after "the longest day," many of us have become comfortable with our freedom. We've allowed the sacrifice of the previous generation to slip from our consciousness, and the storming of the beaches at Normandy becomes, for some of us, just another scene from a Hollywood movie.

But to those veterans who were there, and for those who remain, it is not a movie. It was — and still is — real blood, real pain, real fear, and real courage that drove the Nazis from their fortified postions along the coast of France. Many of these old soldiers still carry the physical and mental scars from their various roles in the invasion. The ones that saw the most action usually say the least — true soldiers are that way — they do not glory in death and carnage. But if you ask them, if you catch them on the right day, oftentimes they'll tell you about Normandy. Their tales will begin quite generally, with talk about planning, movement, and execution — all valuable experiences today's soldier can learn from. But usually, after a while, their stories will become quite personal, and they will speak gently, sometimes in tears, of friends and comrades who are now immortal — forever etched in their memory by their actions on those critical June days. Some came home, some didn't. But all are important.

We owe it to those tough, old soldiers to never forget what they overcame and what they accomplished. We ought to talk to them more, to tell how important they are to us, and last but most importantly, to thank them. Thank them for our freedoms and our security and our beloved nation. Go find a veteran and shake his hand. Talk to him. Listen to him. Learn from him. How can we as professional soldiers do any less?

— J.D. Brewer

ARMOR

The Professional Development Bulletin of the Armor Branch PB-17-94-3

May-June 1994, Vol. CIII No. 3

Features

Departments

LETTERS

New Uses for the Lowly CONEX

Dear Sir:

Captain Christopher Mitchell's article, "Converting a CONEX Container into a Bn/TF Command Post," (*ARMOR*, January-February 1994) made me stop and think, "Gee, I wish I'd thought of that."

CPT Mitchell's solution is certainly innovative and comprehensive. I'm sure that many readers are already thinking of ways to apply this solution to other problems typically found in the field when the MTOE doesn't quite address the situation. I can immediately think of two situations where a CONEX-type system may meet the requirement.

The first of these is as a replacement for the M577 found in the ALOC. Mounting the CONEX semi-permanently on a 2.5-ton truck provides only slightly degraded cross-country mobility (better on hard surfaces), and allows the TF commander to use the M577 as a TAC vehicle. While I was an S3(Air) with 1-68 Armor (Wildflecken), we had the luxury of an extra M577 which we used in this role. Having a duplicate S3 command post vehicle greatly enhanced the transfer of command and control during jumps.

The second is the use as an exercise CP during those occasions when the functionality of a CP is desired but the presence of a tracked vehicle is not. Again, while in Germany, we built up a 2.5-ton truck for the purpose. There were several drawbacks to this approach, not the least of which was that it tied up a vehicle. To make the shelter rugged enough, we built a framework of welded 3-inch pipe, to which we then attached plywood panels. (We also found some fiberglass insulation laying around, so we fully insulated the shelter as well. It

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quickly gained the nickname "S3 Winnebago.") While the resulting shelter worked great, we could not dismount it easily. A CONEX would have given us that flexibility.

Enhancements to the field trains CONEX command post may make it even more flexible, requiring minimal expense. One of these might be permanent mounting on a low trailer, which would still require a prime mover (the HHC commander or 1SG HMMWV come to mind), but would not occupy valuable cargo space in a truck bed. Further, lifting eyes on the CONEX would allow it to be sling loaded and moved by helicopter for those operations where a rigid wall shelter is desired but a wheeled or tracked vehicle is inappropriate. Installation of permanent antenna mounts would promote rapid setup and tear-down.

Long-term use of a CONEX in the CP role will require modifications such as wiring for lights and power, radios and antennas, and ventilation. Safety considerations such as secondary egress must be addressed. Light discipline is another area of concern. Improvements are limited only by our imaginations, however.

As a former HHC commander myself (1-63 Armor (OPFOR)), I recognize the challenge of providing adequate resources to the field trains. CPT Mitchell answers the problems of secondary or support command posts at minimal expense. I congratulate him on his efforts.

MARK L. KIMMEY
CPT, Armor, USAR
Norristown, Pa.

Casualties: "The American Center of Gravity"

Dear Sir:

"Armor in the 21st Century" by MAJ Harold Spurgeon and Stanley Crist (ARMOR, January-February 1994) is a timely reminder that the Army needs to be aggressively focused on the battlefield of the future. Its recommendations of greater armor air deployability in the force projection Army and the greater integration of Army aviation into future operations are well taken. However, there are two points with which I disagree.

The first is the assertion that DESERT STORM could have been fought without the M1. Fought, yes, but not as successfully, not as rapidly, and most of all, not with limited casualties. Because of bad weather including shamals, attack helicopters were frequently unavailable during the heavy fighting between VII Corps and the Republican Guard on February 26 and 27, and American forces without M1s would have suffered fearful casualties had they attempted to force a decisive engagment.

It was the M1s present with the 2d ACR that allowed that unit to persevere in its mission to fix the Republican Guard as the VII Corps' screening force. In contrast, Bradley-pure divisional cavalry was liable to rapid mauling, and required rapid relief by M1 battalions once they had contacted the enemy. From battalions up to divisions, commanders chose to pull back their Bradley-equipped scouts and lead with tanks because they knew that the Bradleys would die where tanks could absorb punishment, counterpunch, and prevail.

We could have won the war without M1s, but I submit that there is no need to win wars by the slimmest of possible margins when it is overwhelming firepower and protection that allow us to win at the lowest possible cost. Casualties are arguably the American center of gravity in any operation (for political and public support reasons), as the situation in Somalia seems to validate. The tragic inability to rescue the misfired Ranger mission on October 3, 1993, due to a lack of armored vehicles, indicates that even in theoretically humanitarian operations there is a case to be made for heavy armored support.

My second problem is that I don't believe that helicopters and ground vehicles can be integrated into the same platoons in the near future, if ever. This is not an issue of inexperienced leaders at that level, but rather the radically dissimilar nature of helicopters and ground vehicles. While ground vehicles occupy space and have supplies pushed forward to them, helicopters only temporarily "borrow" space between trips back to refueling and rearming positions. The notional multi-role platoon would be at only half strength much of the time, and the poor lieutenant would have to keep track of helicopter support elements far to his rear. A better way to incorporate Spurgeon and Crist's recommendations would be to explore pushing coordinated ground-air operations down to lower levels. But for rational and efficient use of resources, their platform-specific support requirements should remain segregated into separate units which can meet these needs more effectively.

These quibbles aside, the authors correctly identify the need to develop rapidly deployable armored forces closely integrated with attack helicopters as a primary means to meet and dominate the battlefields of the future.

DAVID NILSEN
Bloomington, Ill.

Another Look at the Motorized Division

Dear Sir:

The recent flurry of activity about the Armored Gun System (AGS), as well as Major Spurgeon and Mr. Crist's article in the January-February issue, is invigorating stuff for the Armor community. A former tank battalion commander and Second Armored Regimental Cavalry S3 probably shouldn't say this, and undoubtedly runs the risk of being blacklisted or barred from Fiddler's Green by his Armor counterparts. Ah — but the truth will out — so here goes!

As a branch, we have been flirting with extinction, or at least significant modification of our utility, for a long time. Why, you ask? In just plain Cajun — it's because we are too heavy, cost too much to operate, and can't really participate in a force projection strategy because we cannot rapidly deploy!

As Major Spurgeon and Mr. Crist point out, I hope the next jerk like Saddam Hussein cuts us enough slack to give us the time needed to deploy the significant amount of iron we used in DESERT STORM. But I wouldn't bet on it! We've got to get there quick and we've got to have the equipment and operational techniques that allow us to do the deed when we get there. Insofar as the latter, I think we're in pretty good shape.

We used to have this thing called a motorized division — the 9th Infantry Division (Motorized). Designed as a middleweight, and structured at the brigade level, in a fashion strongly reminiscent of the old regimental combat teams, the division initially used the Improved TOW Vehicle (ITV) and then the HMMWV TOW as its pivotal weapons platform. Ahh — you say, there it is — any self-respecting, strapped, Dehner tanker boot-wearing real man knows that you ain't gonna kill nothing with a HMMWV TOW. To which I reply, although certainly not ideal, I would ask that you check the results of at least three brigade combat team rotations at our training Super Bowl — the NTC.

Although memory fades (and we have the tendency to only remember the good stuff), I think a cursory review will show that these brigades amassed the following impressive results:

● A consistent operational ready rate of 95%.
● A "kill ratio" against one helluva tough OPFOR in T-72s and BMPs which ran 30-40% higher than the normal heavy brigade rotation.
● Records (which may still exist) for the best battalion and brigade kill percentage against the OPFOR — both in individual battles and for the entire rotation.

I could go on, but suffice it to say that after the OPFOR got over their giggles about "those non-survivable" HMMWV TOWs (that took the first battle) — they realized that this mounted motorized force was for real. During the final After Action Reviews for each brigade rotation, a common theme was, "Ya'll done good, but you'd really be hot stuff with an AGS..." WAIT OUT!

I don't want to indicate that we've been a little slow about the acquisition of an AGS, but both the current Chief of Staff of the Army and I had hair when we first committed ourselves to it. We are both now follically-challenged! Folks, we clearly got to

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

Information Age Dawns
At 1994 Armor Conference

This year's Armor Conference differed from previous ones in significant aspects. The intent was to immerse the participants in the world of virtual reality training and the digitized battlefield of Force XXI — the Army of the 21st Century.

To accomplish this immersion, key presentations were supplemented by placing attendees on the future digitized battlefield through multimedia and distributed simulation representations. This was followed by extensive hands-on participation in various training exercises using virtual and live equipment. The goal was to provide the force with the opportunity to see, touch, and experience the power of the Information Age as it applies to the business of warfighting. The message presented was that Force XXI is about using advanced technology, innovative organizations, and refined doctrine and training to produce commanders better able to practice the art of battle command with more capable, agile, and versatile units.

Another way the Armor Conference differed was the focus on fundamental change across the entire Mounted Force, rather than a more narrow view of Armor and Cavalry.

Some might question why the traditional focus of the Armor Conference was diverted to a more general discussion of "Mounted Forces." An under-

lying question could be whether this approach runs counter to the concept of branch. Interestingly, the same questions were asked during the Chaffee Era as the established branches of Cavalry, Infantry, and Artillery tended to view the new Mechanized Force, and later Armored Forces, as competitors.

The current Armor Branch, and the Armor and Cavalry Force it represents, were born of the concept of combined arms. Our focus on the entire mounted, combined arms team is not new — it is fundamental to the way we do business. In creating the first American armored divisions, Chaffee described them as "a balanced fighting team of combat arms and service units all of equal importance and equal prestige."

Given that we organize, train, and fight as combined arms teams, one might ask, "What is the relevance of branch?" While we seldom operate as pure elements of any branch, branches are and will remain both relevant and essential. They in many ways are the "professional glue of our business — the embodiment of the history, traditions, and values of our portion of the profession." The branch structure and proponent system contribute to effective personnel policy, individual training, combat and materiel develop-

ment, small unit doctrine and TTP, and professional development.

The traditional role and concept of branch meld neatly into the renewed emphasis of the mounted, combined arms team. The evolution of our overarching doctrine contained in the latest FM 100-5, *Operations*, provides the framework. The concept of Battle Dynamics — areas where battle is changing — provides the vehicles. The Battle Dynamics of Battle Space and Battle Command, in particular, help us focus on the entire Mounted Force as the central feature of our mobile warfighting capability. They also led to the establishment of the Mounted Warfighting Battle Laboratory, TRADOC's agent for preparing the mounted portions of Force XXI.

As Director of the MWBL, I serve as the "Integrator of the Mounted Combined Arms Team," just as my counterpart at Fort Benning integrates the team — including mounted elements — playing in the Dismounted Battlespace arena. Battle Lab Directors carry a broader, more universal responsibility along with their branch proponency roles. They, in essence, become proponents for that entire portion of the battlefield falling under their respective Battle Dynamic. The focus of the Armor Conference merely reflected this reality.

Author's Photo

When Tanks Took Wings

Seventeen combat-loaded M41A3s,
with their Vietnamese crew aboard,
flew into battle 28 years ago.

by Colonel Raymond R. Battreall, U.S. Army, Retired

Author's Note: I'm writing to relate a historical milepost for Armor which could not be told before because the State Department disowned us at a rather high level of classification. Sufficient years have passed, however, that everything has long since been automatically downgraded. A routine notice of this historic movement — routine at least from the Air Force's point of view — appears in the USAF operational history of the Vietnam era.

From March into May of 1966 the Buddhist chaplains of the Army of the Republic of Vietnam's (ARVN) crack 1st Infantry Division incited their troops to open mutiny against what was perceived to be the Catholic-dominated government in Saigon. All operations against the enemy ceased, and the division began moving south against the I Corps headquarters in Da Nang. There was considerable anxiety that the corps HQ might join the mutiny, for the commander and several key staff officers were Buddhists.

Organic to the ARVN 1ID was the 7th ARVN Cavalry whose commander wanted no part of the mutiny. But he realized that, no matter how it came out in the end, he and his squadron would still have to work with the division. He therefore obeyed the order to march on Da Nang with his three armored cavalry assault troops and one troop of M41A3, 76-mm gun "Walker Bulldog" light tanks. But he seized every excuse to delay his movement and, in fact, avoided any contact with troops loyal to the government.

His intentions, however, were not known to Military Assistance Command, Vietnam (MACV) HQ because the Senior Corps Advisor, Marine LTG Lewis Walt, had restricted all advisors to their billets. His intent was to avoid U.S. involvement on both sides of the mutiny. (During the fall of 1965, during an uprising of Montagnard tribesmen, U.S. Special Forces advisors found themselves facing Government Troops advised by other U.S. Army trainers.)

Walt's order resulted in the loss of all communications with the units involved. MACV was, therefore, very much concerned about the armor threat to Da Nang.

4th ARVN Cav, headquartered just outside Da Nang, also wanted to remain loyal but was faced with the

same dilemma of not knowing which way the corps HQ would go. Its commander literally refused to answer either the telephone or radio from corps, thereby evading the need to take sides. Meanwhile, Prime Minister Ky had dispatched three VN Marine battalions to Da Nang by sea and was worrying about how to counter the armor threat given 4th Cav's uncertain status. He hit upon the idea of sending 1st Troop (M41A3), 5th ARVN Cav from Xuan Loc in III Corps to Da Nang. The only way to get it there in time was to airlift it, so he called upon MACV for help.

As Senior Advisor, Republic of Vietnam (RVNAF) Armor Command, I can only speculate as to how high up the chain the decision was made, but one day in April, I received instructions from MAC J3 (MG William De Puy, later CG, TRADOC) to supervise the loading of 1/5 Troop aboard four USAF C-133s at Tan Son Nhut Airbase. I learned that the C-133 was, in fact, a "stretch" C-130 with a lengthened fuselage. Its internal dimensions could accommodate two M41s if we could get them inside without tearing the plane apart and if we could keep the load balanced. We would have only ¼-inch clearance on each side!

When the fully combat-loaded tanks (fuel, ammo, rations, and crew individual gear) met the aircraft, I gave the U.S. loadmaster their weight from the vehicle's tech manual. He labored with a slide rule and then told me where to place them inside. Having learned long before that the best way to load armor on a train was for the officers to lead the way to the loading dock and then get out of the way while the sergeants and drivers did their thing, I gave the word to the ARVN platoon sergeants and stood back to watch. Everything went slowly but smoothly as each tank backed into the plane. This having been done and the tanks tied down, I asked the loadmaster where he wanted the crews to sit. He replied in horror, "My God, Sir, we can't take the crews. We already have waivers for wing load and floor load, and besides they'd screw up my center of grav-

ity." I explained that the weight of the crew was included in the weight of the tank I'd given him, and he replied, "Well then, Sir, I guess they'd better ride in their tanks." And that's exactly what they did!

I admit to worrying as the first plane waddled out to the runway and to holding my breath as it started its takeoff roll, but it broke ground smoothly and disappeared to the north. We loaded the remaining aircraft. By the time the last was ready to go, the first had returned from Da Nang for a second load. Each plane flew two sorties, and one flew a third to deliver the seventeenth tank. Just as this last tank was loading at around midnight, a USAF sergeant tapped me on the elbow and asked if I was Colonel Battreall. He then handed me a TWX message which I read by flashlight.

It was addressed to me by name from the State Department in Washington and read, "You are interfering in domestic politics. Cease and desist forthwith." It was signed "Rusk." For a split second I contemplated a reply, asking the Secretary just what he thought we'd been doing all along, but discretion prevailed. Thinking of Gen. Patton's reaction when ordered not to seize Palermo during World War II, I said, "Sarge, you didn't find me out here in all this darkness, noise, and confusion, did you?" He thought briefly and replied, "No, Sir, I guess I didn't." I told him to return to his office and I would be in to accept the message shortly. I waited until the last flight broke ground and then acknowledged receipt.

I recall wondering how Dean Rusk got my name and marveling that he

thought a brand-new LTC (I had barely five months in grade at the time.) could marshal one fourth of the world-wide USAF inventory of C-133s and get every waiver in the book without considerable help from much higher pay grades. Nonetheless, we had accomplished the first combat-operational airlift of tanks in the history of warfare. Oh, sure, we had flown empty tanks once around the airfield to prove we could do it on Strategic Army Corps (STRAC, FORSCOM's predecessor) mobility exercises; and we'd flown empty tanks over oceans when the delivery priority was high enough. But never before had we flown combat-loaded tanks with crews ready to go into action on arrival at the other end. And that is just what 1/5 ARVN Cav did! The M41s shown on TV clearing the streets of Da Nang of mutinous elements were theirs.

I never did answer Secretary Rusk's message, though I suppose somebody did. Its classification and political sensitivity were such, however, that I felt constrained not to report this historic event at the time. But 28 years have passed, and it's about time for the armor community to learn what happened.

Colonel Raymond R. Battreall, (Ret.), was commissioned in Cavalry from West Point in 1949 and served in the 14th, 11th, and 3d ACRs and 1st Cav Div. He was Senior Advisor to the 4th ARVN Cav from May to Nov 65; Senior Advisor, Republic of Viet Nam Armed Forces (RVNAF) Armor Command from Nov 65 to May 66 and again from Aug 70 to Apr 72. He also commanded 3d Sqdn, 3d ACR in 67-68; served as SJS, SOUTHCOM and Deputy Chief, U.S. Military Training Mission, Saudi Arabia; and completed his service as Director of Armor Doctrine, USAARMS, Ft. Knox, in 78-79.

A Future U.S. Main Battle Tank For the Year 2010 — A New Vision

by J.B. Gilvydis

Introduction

The U.S. tank design community, looking toward the tank of the year 2010, is following two parallel pathways, one conventional and the other electrical.

These paths will explore not only improvements of present tank technologies, but the development of new technologies which are essential for laying a sound foundation for the tank of the year 2010. But why two pathways; why not just one? There is a reason: the all-electric tank is considered a very high-risk proposition that may not materialize. But that does not mean we should abandon it outright. We should try to approach it with a well prepared and coordinated plan.

The all-electric tank, of course, is not a new idea. Many people worked on it in the past. Unfortunately, there has been a lack of progress in the electric armament and high-power electric storage technologies. A new method will have to be devised and followed with the emphasis on coordination and seriousness.

We certainly cannot discount the possibility that someday, somewhere, someone will be successful in this endeavor. If so, it could bring us a very big pay-off. It is well worth trying.

We also should proceed with continued development of conventional technologies. This approach still leads to many exceptional improvements and is a proven, low-risk path. It can also serve as a fall-back position. We certainly should never put all our eggs into one basket. There is too much at stake, too much to lose.

For the future, we are planning a light and highly mobile U.S. combat

"One should not think of a tank as some kind of a ton-weight entity, which unfortunately is the "in" thing to do today. A tank is not just any vehicle carrying a tank gun."

force. The tank that will be a member of that force is also projected to be much smaller and lighter in comparison with its oversized and overweight counterparts of today. The weight goal is 50 tons. Of course, this does not mean that the future tank could not turn out to be much lighter or much heavier than 50 tons. It all will depend on how successfully the required technologies can be developed.

Of course, our primary objective will be to hold and preserve the three main tank characteristics that distinguish it from other combat vehicles — firepower, survivability and mobility. One should not think of a tank as some kind of a ton-weight entity, which unfortunately is the "in" thing to do today. A tank is not just any vehicle carrying a tank gun. That would not require any great preparation. What we are talking about here is a different kind of beast — a true main battle tank for the year 2010.

The Threat

The threat date against which its requirements should be written, however, is not the year 2010, as most people would falsely assume, but 2010 plus a number of years representing its life. Thus, for a bare minimum 10-year life, the threat date would be 2020. More realistically, it should be a 20-year life with a threat date of 2030. For argument's sake, let us say it is 2020. Even this date would be a shock to most people who are accustomed to equating threat dates with the date of a tank's introduction. It is time to change and be responsible. It is proposed that for the year 2010 tank, the threat date of 2020 be set as a minimum (2030 would be preferred).

There will be people saying that it is impossible to project what the threat might be around the year 2020, much less for the year 2030. Let us not lis-

ten to them; it is possible to project the threat accurately for the year 2020. There is no reason why it cannot be done.

To develop a successful tank for the year 2010, we will require a major upgrade of some of our present tank subsystems, plus new technology developments. Here is the main list of those subsystems:

Firepower

By the year 2020, we can expect that threat tank protection will improve by a minimum of 50 percent over the present T80U capabilities. A 100-percent would not be a surprise. To deal successfully with these projected increases, we will require a KE round with twice the penetration capability of the M829A2 penetrator, and

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"...We will require a KE round with twice the penetration capability of the M829A2 penetrator, and we do not have anything like that..."

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we do not have anything like that, either in our arsenal or on our drawing boards. Our latest gun systems in development, the ATAC (XM291) and the high pressure 120mm (XM302), will not be adequate either. We will need a new and a much more powerful system.

For the conventional system, we'll require a new gun, either a brand new design or an upgrade of an existing system. With it we'll need a new KE round capable of twice the penetration of the M829A2. It should be relatively light and compact.

For the electrical system, there is a requirement for an EM gun, be it a rail, coil, or any kind of an electro-chemical hybrid. It should be relatively comparable in weight and size to existing gun systems. It should be reliable and cost-efficient. It should have the same penetration requirement

as the future conventional system. In addition, an efficient energy storage system will be required, along with the switches, contacts, cables, heat dissipation systems, etc. that are part of the EM gun system.

Protection

Horizontal Threat. If development follows tradition, and there is no reason to believe it will not, threat KE penetration can be expected to be at least as good as ours. And in the years 2010 to 2020 and beyond that could amount to a substantial penetration. To counter it, we will need armor with at least a 100-percent improvement in protection over what we presently have in the frontal turret armor of the M1A1. This will be a must. So, the armor will have to be light in comparison with what we have today. This implies the armor should have mass efficiencies in the range of 4 to 6 against KE penetrators, and it should work against all the penetrators — all shapes and sizes — and not just some specific ones as it is customary today. This is a tall order. But, this is what we must have if we want a survivable tank in the year 2010.

This same armor, possibly with an additional applique in the form of reactive armor or something new, should also withstand a shaped charge (SC) attack on the order of approximately twice the Hellfire capability. Against this threat, its mass efficiency should be in the order of 6 to 10.

This integral armor, designed against both the KE and SC threat munitions, might not be possible using our existing technologies. It may require radical new thinking and new innovations. It should be of modular design. It also should be designed for both the frontal and side applications, for both the hull and the turret. The side armors should defeat defined threats within a customary 60-degree frontal arc. It also should have design variations for a lesser arc, such as 40 and 20 degrees, for trade-off purposes.

Vertical Threat. Top-attack protection is required against the vertical threat, be it a missile or a bomblet, guided or dumb, using a shaped charge jet or an EFP (Explosively Formed Projectile). Presently, it is stipulated that if a special countermeasure (CM) package (smoke grenades, jammers, etc.) is used on the vehicle, its top attack protection could be drastically reduced both in armor thickness and density. The CM package will have to counter all kinds of guided top-attack munitions by using techniques such as jamming their guidance, misdirection, smoke cover, etc. It prevents guided munitions from hitting their targets. Only the dumb munitions sneak through its cover of protection and are not affected. Presently there is no countermeasure against dumb munitions. They are free to hit their targets. Of course, the probability of dumb bomblets hitting a target is very low, but when high numbers of them are launched over a suspected target, some will hit. They do constitute a threat.

Presently, the top armor (applique) weight distributions for vehicles with CM systems implies that dumb bomblets do not penetrate much, that they do not amount to much as a threat. This is questionable. In the last Defendory Exhibition held in Athens, Greece, October 6-10, 1992, the Russians were selling dumb anti-tank bomblets (PTAB-IM) that penetrate 210mm (approximately 8.25 inches) of RHA. This is a tremendous penetration capability and CM systems do not counter them; at least not yet.

It is highly recommended that top attack protection with its CMs be evaluated in light of these new developments and corrective action be instituted in how to deal effectively with this potential dumb threat. We need better methods to deal with it.

Mines. Presently, there exists a large variety of "bottom" threats. They are land mines with various defeat mechanisms (blast, SC jet, EFP, etc.) made of various materials (metals, plastics, etc.) and having various sens-

ing and trigger mechanisms (pressure, magnetic, IR, tilt, acoustic, seismic, electronic, etc.). The list grows continuously. Presently our tanks are protected only against standard blast mines. They can do a lot of damage — break a track, ruin suspensions and roadwheels, and rip the tank bottom plates open. They can immobilize a tank and kill its crew. Our tanks do not protect against the SC jet and EFP varieties, which can do even more damage.

To make our tanks more survivable against "bottom" threats, we have to find either a more effective way of neutralizing (detecting and clearing) the mines or more effective bottom protection. We certainly need more projects directed towards these goals, new innovations, and new developments.

Active Protection. In the future, we will need to use every possible idea to help reduce and control future tank weight. One of these ideas is active protection, which meets and destroys or cripples the incoming threat munitions before they can reach their intended targets. This technology is now in its infancy. Today, with present technology, we probably could counter only relatively slow-flying munitions at best and then only under laboratory conditions. The real world would be another story.

We recommend more extensive studies in this field. Of course, not every threat will be stopped by an active protection system. Some will sneak through. Plus, the active system may not be inexhaustible. For this reason, such a system may turn out not to be suitable as primary tank protection, but an excellent protection enhancement. It may allow some reduction in the main armor weight. We have to understand that for every threat bullet we stop from hitting our tanks, we are way ahead. Every hit, whether it penetrates or not, does damage that could be fatal to a tank. Effective active protection would be a great addition.
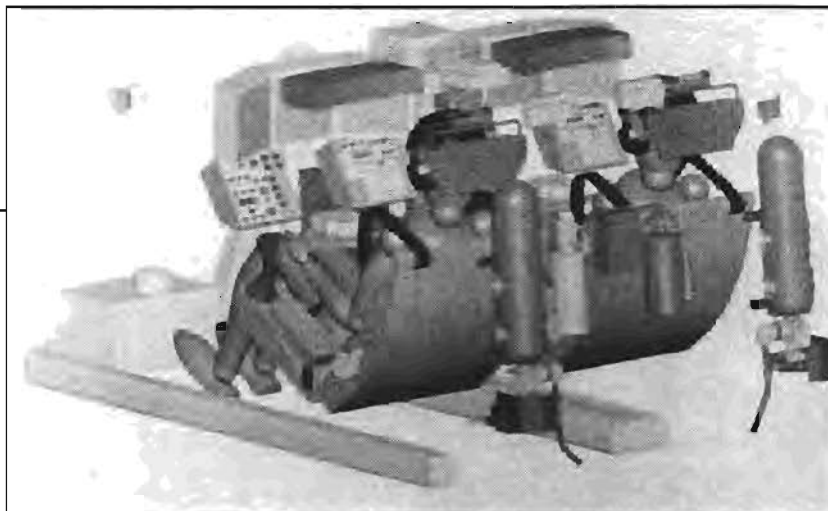
Two-Man Crew Station

For the tank of the year 2010, we project a two-man crew station. There are many good reasons for that. First, all things being equal, a tank could be made smaller, thus lighter. Second, there appear to be enough mature and emerging technologies to develop a safe and effective way to operate the tank with a crew of two, and there would be no reason to use a four-man crew if two can function as well. Third, manpower is expected to shrink and there will be fewer tankers to operate our tanks. Fourth, why expose four tankers to potential danger when a tank is hit? Two-man crews reduce the risk. Fifth, when a four-man crew is in a tank, they are usually assigned to operate for an extended period, up to some 72 hours at times. This tires a crew and renders the tank ineffective. That is not the way to do it. It is much better to have a split crew pool. A four-man crew could still be assigned to a tank, but only two would serve at a time and change frequently. A fresh crew is an alert and effective tank.

There are others who would like to have even more crew members in the tank than there are now. They would gladly take a crew of five or more, or at least keep what they have now, a four-man crew. They argue that extra people are needed for special duties. Security is one of them. For example, when a tank is parked for the night or other reasons, a two-man crew would have a problem in posting a guard. Extra hands may be needed to do various repair jobs on the spot, such as fixing broken track, etc. However,

a large crew size is becoming a luxury that no one can afford anymore.

In today's battles and especially in future encounters, tanks will not operate or fight alone. They will be part of a larger force. There will be infantry fighting vehicles and soldiers with them, which means there should be little problem in finding security guards or someone to fix a broken track. So much for the reasons behind the two-man crew.

Let us look now at the crew station itself. First, let us look briefly at how the present four-man crew functions.

The loader's primary job is to load the gun. His station is also equipped with a very crude observation capability — primitive at best, but something. Thus, at times, he is also used as an extra pair of eyes. Of course, he is also used as a security guard and a track repairman and to perform other minor jobs — a handyman. He can be trained to take other crew members' positions when they are incapacitated, but then there is no loader. His loading function could be replaced by an automatic loader. Many countries, such as France, the former Soviet Union, and Japan, have already done that. The loader does not seem to be missed, so he could be replaced and the crew size reduced to three.

Next, let us look at the gunner. His primary job is to fine-lay the gun on the target and squeeze the trigger. In other words, he operates the gun, he hits the targets — a very important function, no doubt. The question is, do we have to have a crew member to do that? The answer is no. The electronics could take over his functions

and probably do them even more effectively. At this stage of technology, we certainly do not need a crew member to squeeze the trigger. Furthermore, we certainly can track and finelay the cross-hairs on the target with electronics. Thus, we can also replace the gunner.

As we can see, it is possible to replace both the loader and the gunner, maybe not as effectively today, but certainly tomorrow. The tank will not suffer at all. Instead it probably could be made even better. However, there is one thing that will be missed that cannot be replaced — that is the comradeship of the four-man crew. It will not be the same for a two-man crew. But then this is another story.

The commander and the driver will be the crew members who operate the two-man tank. The tank will be shaped and molded with these two operators in mind. Presently, the commander is primarily the one who searches for targets. When he finds one, in most cases, he hands it off to the gunner. If need be, he can service the target himself, and on rare occasions, he does.

In a system without a gunner, the target data (produced either manually or automatically) would be fed directly into a computer. If there should be more than one target, they could be prioritized by the commander or the computer. The gun would then track and service these targets automatically. They could also be serviced by the commander without going through the automatic mode if he choose to do so.

We do not have this system yet. It needs to be finalized, designed, and developed. The building blocks are here. It is imperative, and it is highly recommended, that this "locate, prioritize, track, and destroy" target system be developed. The existence of our future tank depends on it.

Presently, most tank commanders' stations are very unsophisticated. In this age of technology, they could even be viewed as downright primitive. In our tanks, technology applications are behind by a good generation

or so. The tank community is definitely not too inventive in this respect. It tends to live too much in the past.

Presently, our tank commanders have a rotatable low-profile weapon station capable of mounting a variety of machine guns. The commander's station mounts a sight for the machine gun, and for a commander's all-around vision, it has periscopes. The vision is somewhat poor. The commander is also provided with an elbow attachment to the gunner's sight, which the TC can use.

Recently, we have developed an independent panoramic sight to improve the commander's capabilities. It provides the tank with a hunter/killer function. While it is quite an improvement, it lacks an in-depth vision of the battlefield and beyond. To function efficiently, our tank commanders need a system that can provide this capability, and it is highly recommended that such a system be developed. It would provide the commander with a big screen over which he could watch a whole battlefield panorama and beyond. And he could watch it from many different elevations and directions. The input to his vision screen would come not only from the tank's own observation sights, but also from satellites, various aircraft, other tanks, observation posts, unmanned flying observation platforms, and others. This way the commander could see the whole battlefield, pick the targets, and cue them into a computer, or let these tasks be done automatically. The computer would lock in, track, and, together with the gun, aim and fire. We need this kind of capability for a two-man tank to be effective.

Presently, many studies here in the U.S. and abroad, are evaluating tank crew reduction and, in particular, the two-man crew station. There are many articles being written on this subject. All of these studies, however, miss the point. They all discuss *ad nauseam* elements like reduced crew workload requirements, task sharing, function overlapping, fatigue, and other similar items. Some propose to do simulation studies on computers, while others

want to build test beds. It is not that all this is not important — it certainly is in its own way. But all this alone will not solve the problem. What is needed, and none of these studies propose or even hint at it, are new innovations, new developments as described in the paragraphs above, which would not only make a two-man crew station a feasible reality, but also make the whole tank more effective and easier to operate.

Mobility

Power Plants. Our tank power plant of the future is not a critical item. We have a very good development going, called the Advanced Integrated Propulsion System (AIPS), which features high fuel efficiency and compactness. AIPS could function quite well into the next century. It is not the "last word" in power plants, but quite good. In comparison to our M1 power plant, it is approximately half its size. It represents a tremendous achievement in compactness that many did not believe could be done. This, of course, does not mean that we should be sitting on our laurels and doing nothing else. We should continue with research in future innovations. For example, there exists a new diesel development by Melchior, a French company, that represents another grand breakthrough in innovation. Horsepower for horsepower it is even more compact and lighter than AIPS. It would be a good idea to explore the Melchior diesel technology further. Every reduction in power plant size provides us with the opportunity to reduce tank size and weight.

Another possible way to reduce tank internal volume is to equip our future tanks with an electric drive system. Before this can happen, however, there will need to be new ideas, new breakthroughs. Some countries have already developed electric drive systems, but for lightweight vehicles only. No one has developed a system for tanks yet. In today's consensus, however, based on yesterday's work, electric drives for tanks are not the way to go. They seem to require more

space, add weight, and are more costly. Unfortunately, today it is not an attractive alternative, but tomorrow it might be another story. It is highly recommended that we keep investigating in the hope that we may stumble onto some breakthroughs.

Suspension. Our present tank, the M1A1, does have a good suspension system. It is an advanced torsion bar design developed in the late 1970s. It has a high wheel-travel capability which provides the tank with some 30 mph cross-country speed. This is tremendous. It is questionable if the tank's driver would dare to go any faster, especially over an unknown terrain. Presently, we are developing a hydropneumatic in-arm suspension unit which will improve our tank suspension system even further. We could live with that for a long time into the future. A new development featuring a semi- or fully active suspension innovation could provide future tanks with even faster and safer cross-country speeds. Presently, this effort is of relatively low profile. It is recommended that active suspension studies be put on a much higher priority level because the active suspension idea deserves higher visibility and backing.

Track. Our tank tracks are nothing to brag about — they do not last long. Their life is well below the set requirements. We definitely need a better track. It is recommended that we institute a higher priority project in improved track development.

Vetronics (Vehicle Electronics)

The age of Vetronics is upon us. It is a wonderful system — a must. The French already have it in their Leclerc tanks. We are in the process of developing it but are having some problems. No, not with the system and its capabilities, but with its size. At the beginning of its development, we emphasized compactness as one of the major selling points of the Vetronics system. Comparisons showed how small it is in relation to the existing

electrical tank package. To emphasize all this, we saw at one extreme a huge pile of electrical harnesses, representing today's system, and at the other extreme, the Vetronics package. People believed and were impressed. But on the way to its design and development, something happened. It kept growing and growing in size. The way it is heading, it will not fit into a tank. It is getting too big. Granted, the system's capabilities were expanded, but that still does not justify its growth. It is out of proportion.

A prototype of the Vetronics system was recently installed in a Component Advanced Technology Test Bed (CATTB). In addition to occupying a large allocated premium space in the vehicle, it also was necessary to use every nook and cranny inside the vehicle and its armor to squeeze the package in. If this problem is left unchecked, one might be forced to reverse the process of installation and start toying with the idea of how to install the tank into the Vetronics instead. It might not be that bad, but it is something to think about. In any case, it is recommended that the Vetronics system be reassessed and a drastic miniaturization process be instituted. An upgraded Vetronics system will be a must for a two-man tank of the year 2010, but it will need to undergo a drastic reduction in its present size.

Summary

I've listed here many of the new technology developments needed for the tank of the year 2010. It is not an all-inclusive list, but it does cover all the major tank subsystems. It is a must list. If these technologies are developed, as recommended, we will have a magnificent tank; there is no doubt about it. Otherwise, we will get a mediocre tank at best. What are the chances that our next tank will be revolutionary? It will depend on our willingness to change. There is a stumbling block that has to be removed first. That stumbling block is

our fragmented tank community. It almost mirrors the loose conglomeration of "tiny empires" of the pre-Iacocca Chrysler Corporation. Our tiny empires do not kindly listen, do not take orders, and fiercely adhere to the "not-invented-here" syndrome. It has to be changed, then our chances will be excellent. But if the tank community continues to function in its fragmented, semi-independent way, where everyone is working for himself, we will fail to achieve the requirements projected here for an effective tank in the year 2010.

Presently, no one organization is responsible, no one organization is accountable for the actions or lack of them in their tiny empires. We lack the authority to plan, coordinate, and oversee all tank-related work. We certainly need a powerful central tank office with full authority to control all factors of tank work. Which way we will choose to go is up to us. Will it be with the soldier, the Army and the country, or the tiny empires? Time will tell.

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The New MPAT Round

The New 120-mm M830A1 MPAT round, with a proximity fuze Gives U.S. tanks a new weapon against helicopters

by Sergeant First Class William Fogg and Staff Sergeant Robert Horner

Over the next several years, the Army will be fielding a new HEAT round (Figures 1 and 2). This new HEAT round has both a full frontal impact switch assembly and a proximity fuze that will give Abrams crews an effective weapon against enemy helicopters.

Unlike the current HEAT round, which detonates on contact with the target, the proximity fuze detonates the round when it is *near* the target. So, even a near-miss is likely to destroy the helicopter.

A selector switch, set by the loader before chambering the round, arms the M830A1 for either ground or air targets. In ground mode, the new round performs like the current HEAT round.

Introduction of the new round will be gradual, with first priority going to units most likely to deploy.

The round will require some hardware modifications to the fire control system, including a new gunner's auxiliary sight reticle, gunner's primary sight lower panel, and revised ballistic information.

With its switch set to Ground mode, the MPAT round is designed to destroy lightly armored ground targets (the same as the M830), bunkers, buildings, the sides and rear of enemy tanks, and enemy personnel. M830A1 cartridges will be shipped to units with the Air/Ground switch set to Ground mode.

Engagement Techniques

Gunnery techniques for engaging either ground targets or helicopter targets in the open is the same as for any other main gun round. Gunners place the AMMUNITION SELECT switch to MPAT (Figure 3), lay on the visible center-of-mass, lase, and, when given the command by the tank commander, fire. The loader either checks that the air/ground switch is set to ground (ground mode) or sets the switch to air and announces "AIR" (air mode) then chambers the round and announces "UP" (Figure 4). In air mode, a black cloud of smoke is produced when the round functions on a target. This smoke allows the firing tank or wingman to sense MPAT rounds employed against helicopters.

In air mode, after the proximity fuze is fully enabled, the round will function on almost any object it detects, whether it is a target or not. Therefore, in a cluttered environment, it may be necessary to use an alternate aiming point to help ensure that the round does not explode before it is in the vicinity of the target. For example, if the target helicopter is hovering or flying close to a group of trees, the round may function on the near edge of the tree line; if the target helicopter is using the top or side of a building for cover, the round may function on the building. In either case, using an alternate aiming point increases the standoff between the clutter and the trajectory of the round (whether in deflection [2.5 mils] or elevation [2 mils]), and, therefore, increases the chance of the round functioning on the desired target. Figure 5 displays a deflection offset; Figure 6 displays an elevation offset.

An MPAT round fired in air mode at a ground target will probably explode before reaching the target.

Degraded Mode Gunnery

Part of the fielding of the MPAT includes new GAS reticles. These new

Technical Data and Fire Commands

Muzzle Velocity	1,410 meters per second
Fuzing System	Point Initiating Base Detonating (ground mode). Proximity or Point Initiating Base Detonating (air mode).
Announced in Fire Command as	"MPAT" (ground mode) "MPAT AIR" (air mode)
Employment	Lightly armored vehicles, buildings, bunkers, antitank guided missile (ATGM) platforms, and personnel. Secondary round for tank or tank-like targets (ground mode). Helicopters (air mode).
Color Code	Black with yellow letters
Base Case Markings	See Figure 2
Weight	50.1 pounds
Length	38.74 inches
Battlesight Range	1,000 meters
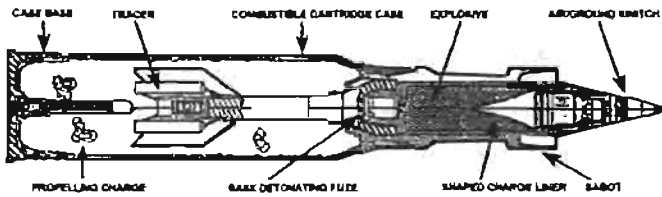
Figure 1. M830A1 MPAT Round

MADE IN USA

VTT92C009-007

MPAT

CRTG, 120MM,
HEAT-MP-T, M830A1
MHM93C001S684

Figure 2. Base Case Markings

Figure 3. GPS Lower Panel

TIME IN SECONDS

1. Spring tab releases round.

2. Loader extracts round and begins to turn toward gun.

3. Door starts to close two seconds after loader removes knee from switch.

4. Loader checks and/or sets Air/Ground Switch and announces AIR if setting the switch to AIR.

5. Loader swings around toward breech.

6. Door is closed. Loader rams round, moves SAFE-ARMED handle to ARMED position (up), clears path of recoil, and announces UP.

Figure 4. MPAT Loading Sequence
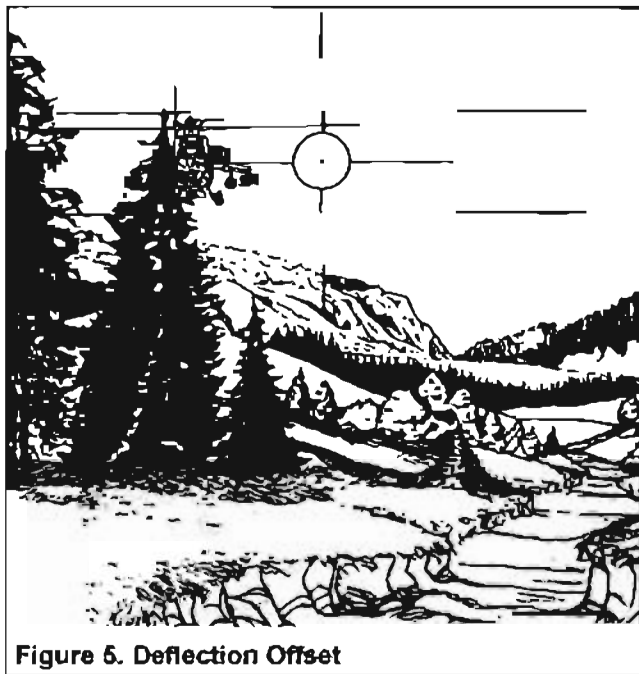
Figure 5. Deflection Offset
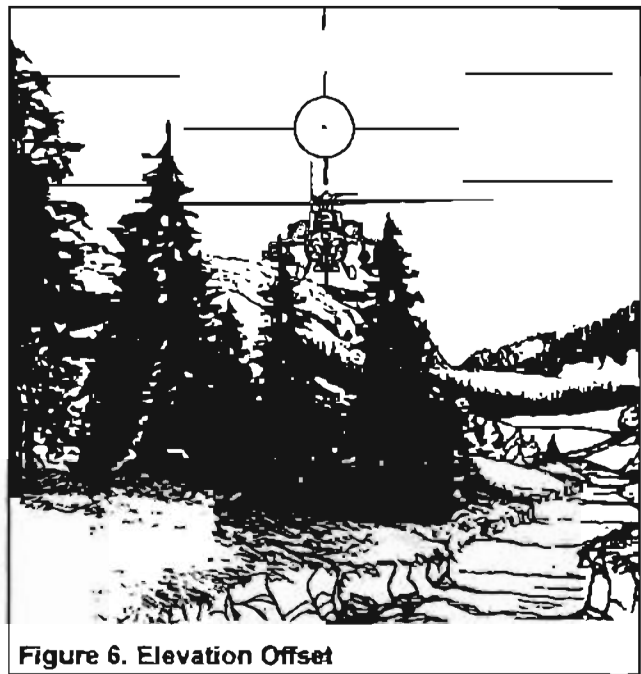
Figure 6. Elevation Offset

reticles provide the capability to fire SABOT, STAFF, MPAT, and HEAT rounds (Figures 7 and 8).

Gunners firing MPAT using the GAS against moving targets should apply a standard lead of 2.5 mils (compared to 5.0 mils for HEAT).

The XM-943 STAFF round will be fielded at a later date.

The stadia reticle pattern will be included on both reticles. If the laser rangefinder is inoperative, the stadia reticle may be used to determine the range to a target. The pattern has a base line and a series of range lines for full-height targets (Figures 9 and 10) and a series of dots for ranging at a target in turret defilade.

The reticle is scaled to a 2.41-meter fully exposed target and a 0.89-meter turret. If the target has a different height, the accuracy of the range determined will be degraded accordingly.

Air Search

While crewmembers scan their assigned sector for ground targets, they must also be aware of air targets. To aid in the detection of air targets, crews should use the horizontal or vertical search technique described in FM 17-12-1-1, Chapter 6. Crewmem-

bers should periodically search their assigned sector using the rapid scan method to check air space above the sector. As each crewmember completes a rapid scan across the sector and his field of view meets the horizon, he should switch to a detailed search and make a careful, deliberate search and make a careful, deliberate

search of tree lines, valleys, and possible air corridors silhouetted by distant background terrain.

Attack helicopters try to engage at extremely long ranges, therefore, target identification is difficult. Crews must make every effort to identify the target correctly (identify friend, foe,
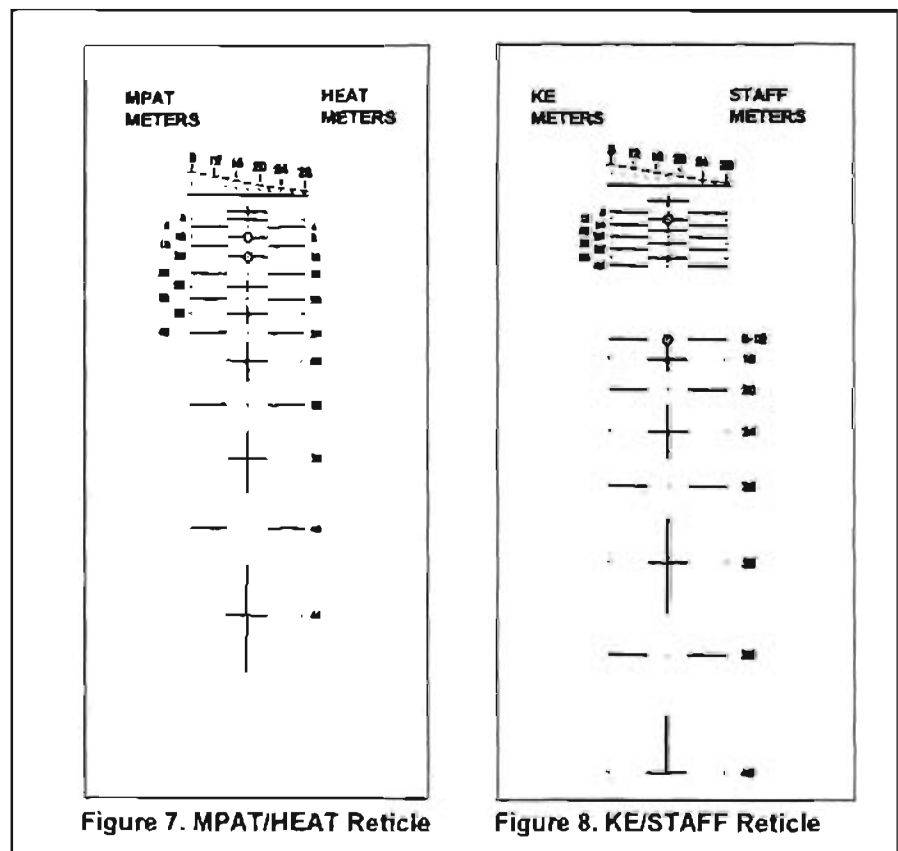
Figure 7. MPAT/HEAT Reticle

Figure 8. KE/STAFF Reticle
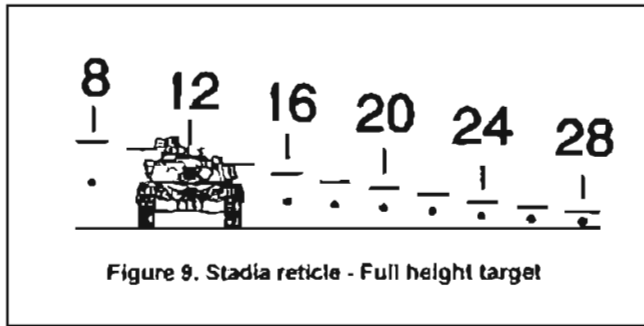
Figure 9. Stadia reticle - Full height target
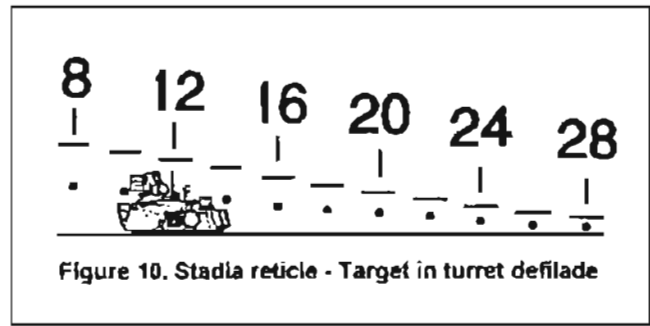
Figure 10. Stadia reticle - Target in turret defilade

or neutral [IFFN]). To prevent fratricide, leaders must keep crews informed of friendly aircraft operating in their unit's sector.

Based on mission, enemy, terrain and weather, troops, and time (METT-T), the unit commander may establish air guard(s). An air guard is a designated tank (or tanks) with MPAT battlecarried in air mode; the air guard is primarily responsible for detecting and engaging aerial targets. A crew on air guard searches for aerial targets in the same manner as other crews. Gunners search their assigned sector using the search and scan techniques outlined in FM 17-12-1-1, Chapter 6, however:

● Sector limits established for the gunner must cover likely helicopter locations and avenues of approach.

● Gunners must ensure ground reference points are always within their field of view.

Tank Crew Gunnery Skills Test

Once tanks have been upgraded, Station 2A (Identify 120-mm ammunition and explain its use) will include identifying and explaining the use of MPAT and Station 8B (Load the 120-mm main gun) will be added to include loading SABOT, HEAT, MPAT (ground mode), and MPAT (air mode). The time standard for SABOT, HEAT, and MPAT (ground mode) remains 7 seconds. MPAT (air mode), on the other hand, is 8 seconds.

Training

A training support package will be made available to the trainer that will enable him to train MPAT. The training support package includes an upgrade to the conduct-of-fire trainer (COFT), dummy rounds, video tape, and an MPAT training pamphlet. The training support package will be fielded to units receiving the M830A1 MPAT round tank hardware upgrade.

Conduct-of-Fire Trainer (COFT) will be the primary means of training the complete capabilities of the MPAT round. Upgrades to COFT will occur in two phases.

The phase 1 upgrade will permit engaging light armor targets using MPAT in the ground mode, and heli-copter targets with MPAT in the air mode. In the air mode, the target hit plates have been expanded to simulate the effective radius of the proximity sensor. Ground mode operation will require a hit. The Instructor/Operator (I/O) will have the capability to "LOAD" either air or ground mode based on the tank commander's fire command. The combination KE/STAFF and MPAT/HEAT GAS reticles will not be available. This upgrade will be delivered to units starting in 1Q FY 94 and will continue until the phase 2 upgrade is ready for distribution.

Phase 2 of the COFT upgrade will provide a "full-up" MPAT capability, evasive helicopter targets, clutter effects, bunker targets, and KE/STAFF and MPAT/HEAT GAS reticles. This upgrade should begin distribution about 3Q FY 95.

Thirty M830A1 dummy rounds will be produced for each tank battalion and 22 for each cavalry squadron. These will be distributed through the Training Support Center (TSC) and will be available before units receive MPAT rounds. If a dummy round becomes unserviceable, units should notify their local TSC. The M830A1 MPAT training video will demonstrate the MPAT capabilities and crew duties. One tape will be mailed directly to each battalion-size unit that is fielded with MPAT before January 1994. After that date, units will be able to order the video through their local TSC.

The MPAT training pamphlet will be distributed directly to units receiving the MPAT round until the completion of the MPAT fielding plan. The pamphlet describes engagement procedures for MPAT, revised Armament Accuracy Check (AAC) Data and Computer Correction Factors.

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Staff Sergeant Robert Horner is currently serving as an armor gunnery doctrine writer with the Gunnery Training and Doctrine Branch, 5th Squadron, 16th Cavalry, Ft. Knox, Ky. Previously he served as a master gunner and tank commander in 2-64 Armor, Schweinfurt, Germany.

The Driver's Thermal Viewer:
A DESERT STORM AAR

by Captain David L. Gallop

On 11 January 1991, representatives of the Hughes Corporation delivered nine Driver's Thermal Viewers (DTVs) to A Troop, 2d Squadron, 4th U.S. Cavalry. The following is a review of the DTV's performance during Operation DESERT STORM.

The mission of A/2-4 Cav was to lead the 24th Infantry Division (Mech) through some of the worst terrain in Iraq. The mission called for lightning-paced, nearly uninterrupted movement that would ultimately reach the Euphrates River Valley. Key to this movement was the troop's ability to move quickly and provide valuable intelligence on terrain and enemy. A unique tool in A Troop's arsenal was the DTV.

Background. The DTV is very similar to the thermal mode for the gunner's Integrated Sight Unit (ISU). The DTV displays images based on contrasting temperatures. It has two polarities, white hot and black hot. The sight mounts in the same manner as the VVS2 passive sight. The DTV receives its power from the vehicle via a power cable.

Assigning DTVs to CFVs. As the A Troop commander, my first decision was what vehicles should receive the DTVs. I envisioned the DTV as primarily a command and control aid. Specifically, with its enhanced capabilities, the driver could relieve the Bradley commander (BC) of some of the burden of navigating the vehicle. This would free the BC to concentrate on controlling the platoon.

With that in mind, I distributed the nine DTVs to the troop commander, platoon leader, and platoon sergeant CFVs. I still had two DTVs remaining. They went to the Combat Recon-

naissance Patrol (CRP), a scout section that operated well forward (up to 5 km) of the troop to provide early warning. The DTVs would enhance their survivability by aiding in target acquisition.

Installation. The manufacturer's technical representative instructed the CFV drivers on installation and operation of the DTV in about 15 minutes. The DTV installs much the same as the VVS2, with some minor but significant differences in hardware. The VVS2 installation latches often fail, causing the sight to fall rudely into the driver's lap. The DTV, on the other hand, has screw-in bolts that seat the DTV securely in place. The VVS2 is also subject to rotating in its mount. This happens through vehicle vibration or from the driver inadvertently hitting the sight with his head. The DTV mounting hardware eliminates that problem.

Unlike the VVS2, the DTV does require a cool-down period of five minutes prior to operation.

The DTV proved to be more user-friendly than the VVS2. The controls of the VVS2 are on the same side as the driver's intercom switch, resulting in some awkward moments. The DTV controls are on the opposite side of the intercom. The image on the DTV display also causes less eye strain. The VVS2 user will often suffer from

The Driver's Thermal Viewer (DTV) enables drivers to see through darkness and battlefield smoke and haze. Additionally, it provides a surveillance capability during silent watch and has sufficient range for close-up target acquisition.

headaches due to eye strain, but DTV-equipped drivers never did.

If a driver needs to use the dome light in the driver's compartment while using the VVS2, the internal light will cancel out the image on the VVS2 display, a very unsafe situation if the vehicle is in motion. The DTV display remains consistent while the dome light is on.

The DTV proved to be very versatile while traveling cross country. As mentioned earlier, the DTV does not move left to right, but it is capable of moving up and down. This allows the CFV driver to look down the front slope while approaching a downgrade. He can also elevate the sight 30 degrees above the horizon to check uphill slopes.

The DTV also has a grid etched on its display that drivers can use to maintain required distance from lead vehicles. They would do this by adjusting the elevation on the DTV to place the lead vehicle's thermal image in a grid and keeping it there by adjusting the CFV's speed.

A DTV-equipped driver can also follow the "hot" tracks of lead vehicles. However, if a DTV-equipped CFV should be following too closely to an M1, the DTV can suffer thermal washout.

Limited Visibility Conditions. The VVS2, as a passive night vision system, intensifies ambient light. The VVS2 is very susceptible to moon and cloud conditions. The DTV does not rely on ambient light. You can also use the DTV during daylight.

The DTV was very useful during sandstorms. Drivers were capable of seeing through the blowing sand.

Like the VVS2, the DTV's image will fade if rain builds-up on the receiver. Frequently, drivers would have to wipe the receiver dry.

Route Selection. The DTV is capable of detecting moist soil. This was particularly helpful as the troop approached the Euphrates River Valley and the area known as the "dismal bog." A DTV-equipped driver was able to avoid sink holes that normally could not be seen at night.

In the vicinity of Tallil Airfield, the DTV provided the driver with the ability to detect unexploded ordnance (cluster bomb units or CBUs) on the surface or slightly below the surface. Since the CBU would retain heat while the surrounding soil cooled, the CBU emitted a distinct thermal signature. This was an unexpected asset. Although the CBUs caused little damage to tracked vehicles, they posed a definite hazard to the dismounted scout and wheeled support vehicles.

Under Fire. During night engagements with Iraqi forces, the DTV proved its real worth. In essence, the DTV-equipped driver became the gunner's assistant for target acquisition. Not only could the driver detect targets within 50 meters of the front slope of the CFV (his normal area of responsibility), he could detect possible targets out to 5 km depending on terrain.

If the troop was moving in a wedge formation (its standard formation in a movement to contact), each CFV had a sector of fire. For most CFVs that sector was not over the front slope. The DTV allowed the driver to cover that critical frontal area at both near and far ranges.

The VVS2 is subject to washout due to weapons effects. The DTV did not have that problem. On the other hand, the DTV would wash out if you passed too closely to a burning vehicle.

Reliability. The DTV proved very reliable. During the first 48 hours of the ground campaign, the DTVs operated continuously. From the day we received the nine DTVs on 11 January 1991 until the troop's redeployment in April, all but one DTV remained mission-capable.

Summary. The table summarizes my opinion of the DTV's effectiveness compared to the VVS2. As we consider M2/M3 upgrades, or if we should ever receive the dedicated scout vehicle we so desperately need, we must include the DTV.

DTV vs. VVS2

	DTV	VVS2	REMARKS
Mounting Hardware	+	-	Screw-in system on DTV more reliable.
Driver Fatigue	+	-	DTV display easier on driver's eyes.
Power Source	-	+	DTV's power cord easily broken with no battery back-up.
Operability	+	-	DTV is capable of 24-hour operations. An aid in other limited visibility situations (blowing sand, smoke, etc.)
Illumination	+	-	DTV does not rely on starlight.
Image Detail	-	+	Under certain light conditions, the VVS2 provides a more detailed image.
Weapons' Effects	+	-	No washout firing the 25mm (TOW untested)
Reliability	-	+	Not enough data to favor the DTV over the proven VVS2 system.
Cost	-	+	You could outfit an entire platoon with VVS2s for the cost of one DTV. The cost of the DTV would drop if put in mass production.

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Lost Potential: Frozen Groups and Tank Gunnery Performance

by Lieutenant Colonel Edward Earl Hampton, Jr.

Nothing matches the élan and high anticipation of a confident, field-tested unit preparing for gunnery. The stride is more purposeful, the facial expressions more set, and the nuances of professional behavior reflect a barely suppressed bravado based on trust in self and the team.

Such was the case as a certain battalion prepared for gunnery at Grafenwohr. Everyone knew, without any doubt, that B Company would take top honors. After all, it had the best company commander, a man known for hard training standards and deep technical gunnery knowledge; it had the best crews, crews that had taken the previous gunnery; and it was tops in just about every measure for a company. B Company had earned trust and respect. So, in the unit environment where there is always too much to do with too little, B Company was left alone and battalion attention was focused on units with known problems. B Company seemed to be on the road to repeated glory. Yet, B Company barely qualified, beaten by, among others, a company whose projected performance ranged from "iffy" to "solid," certainly not "top gun." The factors that caused B Company to miss its potential and that caused D Company to exceed its potential are well worth study by those who would be "top gun" when all is said and done at gunnery.

Although no unit's performance can be boiled down into one simplistic reason, B Company's underachievement seems centered in a concept known as "frozen groups."[1] Basically, a frozen group is cohesion gone awry. A frozen group is a group that has become so normalized during its socialization process that any deviant behavior is not tolerated, even if such behavior would better the group. Extra achievement is not seen as something positive, but as a threat to the group in that it places a burden on other group members to similarly achieve.

More precisely, frozen groups are abnormally resistive to change — and better achievement is a form of change. Groups are naturally resistant to change but have mechanisms or conventions that allow them to adjust. Winning groups not only adjust but seek change in the form of increased performance. Frozen groups, on the other hand, lack such mechanisms. Further, they have very strong defensive mechanisms — usually peer pressure — designed to maintain the status quo or what is technically referred to as homeostasis. Ridicule is a normal tactic: "What's the matter, trying to break the curve," or "So, what makes you think you're better than us," or "Trying to make us look bad," or...I think you get the picture. Another common reaction is indifference or nonchalance. Frozen groups often epitomize the negative side of machismo — of being "too cool to care."

Such was certainly the case in B Company. Crews seemed preoccupied with a pervading desire to avoid embarrassing each other (or being embarrassed). Its "preparation" for gunnery centered more on "maintenance." Maintenance in this case being defined as "reviewing" and "brushing up;" or, in the case of crews who felt threatened by a potentially better crew, actually doing some debilitating ridicule. Crews in B Company did not feel the need for the rigorous drilling that other companies were doing. After all, B Company was "best by test" and had proved it had the basics down pat. If the S3 expressed any doubts about the veracity of B Company's gunnery preps, he was essentially reminded that they were the same company that had taken top gun in the previous gunnery and that he "ought to concentrate on other less capable companies and not rock a successful boat." B Company's attitude seemed to convey a basic belief that, if they did go to basics, other companies might seriously consider outgunning them or, worse, that "mean old S3" might start to work them like the other "lesser" line dogs. No, better to portray utter self-confidence rather than introduce any doubt as to ability. Anyway, they were not average tankers; no they were "graduate level" tankers. No need to worry. NOT!!!

Contrast their behavior with D Company. D Company had a strong company commander and a super first sergeant but suffered from high turnover and three new platoon leaders. Talk about pre-gunnery jitters! Yes, the company was of such caliber that an outsider would have seen nothing but confidence, but the pangs of self-doubt were there nonetheless. When the voices of bravado were heard at staff meetings in the form of boasts and wagers, D Company was silent. After all, how could you vote on an unproved unit. The answer to challenge was a determined, "We'll let the record talk." D company did everything by the book and beyond. It spent almost double the UCOFT time, even going around the clock just prior to gunnery (compared to B Company that stopped about one month prior to gunnery upon meeting minimum UCOFT qualification requirements to "conserve itself"); it drilled fire commands until the responses were automatic (compared to B Company that did not feel the need, after all, it had taken first place last gunnery with the same crews); and even drilled calibration and zeroing. (Interestingly, during the previous gunnery, it was B Company that faced gunnery with a new commander and a high turnover of TC-gunner pairs. Before that gunnery, drills were the norm, not something to disdain.)

As I watched B Company glumly search through the wreckage of its lost victory, I was reminded of a certain CAT (Canadian Army Team) company that lost its CAT competition. Obviously, it had been the best at one time. It was given everything, to include getting new NOMEX, not to mention having the best tank in the world. It had everything except the professionalism it takes to buckle down to basics; everything but the ability to acknowledge its weaknesses; kind of like any number of professional athletes or teams who are beaten more by overconfidence (and the lack of preparation that ensues) than the skill of the opponent.

Although no one realized it at the time, during its gunnery preps, B Company had become something of a hangar queen being "prepared" for an IG inspection. It still had the streamers, trophies, and war stories of a top unit. Yet, behind the well-maintained image was a unit who allowed its skills and gunnery prowess to decay, victim to inadequate maintenance and a command climate that allowed belief to be untested by training.

And I was reminded of other companies and realized that, unfortunately, winners freezing into losers is not all that uncommon. Here are some thoughts you might want to consider to avoid being embarrassed by unfulfilled gunnery potential. After all, it is up to you whether you follow a B Company or lead a D Company.

How Tank Crews Become Frozen in Performance

To understand how to recognize and remedy or how to prevent the formation of frozen tank crews, you need to understand how they develop.

First, it's tank crews that get "frozen." Tank crews are close-knit groups. The technical term is primary groups.[2] They are groups whose interactions are so close and intense on a very basic level that members affect each other's value structures. Healthy tank crews become so close they almost become a "person" with common values and drives. And although cohesion is normally desired, any virtue in excess becomes a vice. Frozen groups become "muscle-bound" with cohesion à la peer pressure. Any strategy to prevent or remedy frozen group issues has to target the crew and its primary "freezing" mechanism: peer pressure.

Second, the command climate is either stifling or weak. In the case of the command climate being stifling, tank crews freeze because to take initiative invites too much risk and being "frozen" is better than trying and failing. In the case of being weak, tank crews "freeze" at whatever level they want to because there are no counterpressures or ramifications. They settle on the lowest acceptable standards because they are not pushed or encouraged to "go for the gold." The commander creates an environment that either fails to professionally challenge its tank crews (or to cause the better situation of tank crews challenging themselves) or allows crews to foolishly believe that hype can replace solid training; that its okay to be "too cool to care." They create a climate that never teaches its solders that, in the favorite words of one prior brigade commander, "Good enough ain't."

Third, ironically, success creates the potential for becoming "frozen." Once a crew "meets the standard," it has every reason to want to hang onto that success and, tragically, to believe that such success is everlasting, forgetting that gunnery skills have a very short shelf life in the absence of refresher training. They believe that the way to keep success is to maintain self-confidence, war stories, and hype.

Fourth, the tank crew has no set standards. So called standards in units with frozen groups are vague, one-over-the-world "do your best" standards rather than a systematic sequence of developmental standards. Good developmental standards sets progressive goals for every aspect and step of gunnery; i.e., published UCOFT results, fire commands executed within a certain time, sand table exercises conducted within specified parameters a specified number of times, etc. They provide crews a progressive path of development with refreshers to guard against peaking too early.

Fifth, tank crews have standards but no incentives. A basic tenet works here as in any human endeavor, "if you want extra, you gotta pay for it." Asking for more with no additional "pay" will surely "freeze" tank crews as they ignore your program and develop preparatory programs equal to the "pay." As the August 31 page of the 1993 *Life's Little Instructions Calendar* says: "Demand excellence and be willing to pay for it."

Sixth, just as important, there are no disincentives set for marginally passing performance, other than the threat of utter humiliation. The prevailing attitude is the same as the incompetent gym teacher who had no idea how to help so yelled: "Get back in line and think about what you did wrong. Next time, do it right!" Show marginal crews how to do better and then make lack of demonstrated progress hurt — DURING PREPARATORY TRAINING. Failing to address marginal performance only puts the problem on the firing line, where everyone loses.

Seventh, tank crews are permitted to explain away weakness. They visualize themselves winning trophies and awards, but aren't forced to visualize or think through the situations of hard work necessary to win. They, the anointed ones, are allowed to believe that they can't possibly meet a problem they can't handle and, if they do, it can't be their fault. "Aw s—t, Sir. If I can ever get the turret guys to do some decent work on my tank, that wouldn't happen..." And, tragically, the commander buys in instead of forcing the crew to recognize their own role in the problem, to force them to find a workaround. After all, neither the gunnery target nor battlefield enemy really cares where the problem is, it only rewards

— or punishes — those who cannot persevere through its problems. Crews frozen at the high end of performance don't think through the zeroing of machine guns, the potential effects of climatic conditions, the effects of sleep deprivation, etc. Hence, they don't train to constantly check the zeros, they don't condition themselves for heat or cold, or they don't drill crew drills so that responses are immune to environmental conditions such as fatigue. Good crews have played each possible gunnery scenario in their mind and in simulators from preps to execution. Frozen groups will not. Good commanders help crews visualize the hurdles so they can prepare; poor ones don't. It's that simple.

So, how do you prevent this from happening?

Preventing or Remedying Frozen Groups

First, get Involved early on; nothing will derail a gunnery effort quicker than to come in with a plan that essentially tells crews they have wasted their time or, worse, puts them into a time-pressured situation that creates unnecessary stress. Such conditions are sure to be divisive and, if you do have frozen crews, will definitely cause you to have to fight to be taken seriously. In some cases, Johnny-come-lately plans will fall in the category of the cure being worse than the disease. You might not only fail to get your crews drilled in the basics but may destroy the esprit and élan essential to producing winners in the process.

Second, set the right command climate:

a. Focus on some watchwords: challenge, tough standards, and test. Make it OK to admit weakness with an immutable caveat that, once identified, it had better be worked out or strengthened. Then hedge your bet with a series of challenges and tests that forces detailed analysis. Leave no stone unturned:

1) Start with a thorough TCGST, coupled with a thorough inspection of the tank, especially its fire control systems. And, if you have experienced crews, don't just give them the same old test. Give them the basic test with a few highly technical twists thrown in to satisfy the egos of the "graduate tankers" or to humble them. By humbling, I mean to give them a taste, a reminder that they don't know or remember all there is. Watch out! Too much and the effect can be confidence-shattering! (Shattering a crew's self-image is sometimes desirable for recalcitrant crews but such action must be very carefully managed.) And, whereas the possibility exists that there are "haunted tanks" — tanks that are inhabited by evil spirits whose purpose in the universe is to keep down gunnery averages — more times than not mechanical bugs but are crew-induced: either simple oversights, taking procedural shortcuts, or adding some tanker lore device or twist to procedures — "This worked in Graf in '85, by God!" or "Geez, Lieutenant, the only way to knock down a machine gun target is hit the ground and throw rocks on it — ain't no way you can hit one direct without busting your time trying. Saw a whole platoon at Carson bolo trying..." Et cetera, ad nauseam.

2) Write down verbatim every TTVIII scenario and test your crews against the clock. Test them as a crew with an "AI" in the form of your master gunner. Even have them pantomime the moves. Accept nothing less than perfect responses within time standards you set. And do it publicly. Nothing forces a crew to buckle down more than the eyes of its peers.

3) Drill the TCQC on sandtables and on driving ranges. But make it progressive. That is, start as single tanks, then sections, and then platoons. A neat twist on platoon battle runs from MSG Clary, master gunner extraordinaire: put numbers on tank targets for section and platoon runs. Have loaders write down the numbers of the targets a particular tank engaged, in sequence. Then post results in an AAR. Some very interesting things will be revealed about fire distribution and control. Then, after the 3d or 4th run, sections and

platoons stop firing at the same target while leaving others "unserviced." They start the cross-talk so essential to winning teams once you get to this level of training, you will truly have "graduate" tankers on your hands. And publish scores! Make your tankers "walk their talk."

4) Make crews do UCOFT until the hour they get on the buses to go the ranges. Make qualification the baseline requirement, not the minimum standard. Have your master gunner set up new challenges for the super crews or at least have the good crews work with poor ones. Nothing beats the UCOFT for drilling.

5) Make your leadership set up "rinky dink" home station gunnery tables as if they were on the gunnery ranges. Make them set up the commo, the concurrent training, the scoreboards, the coffee table, the camouflage, the debriefing tent, everything the same as if they were on a full-fledged range. Ensure you have moving ranges and moving targets with control vehicles. Why go through such hassles for in-house stuff? So the hundreds of details that go with setting up and running a range do not distract from gunnery. Home station gunnery ranges provide opportunity for dress rehearsals. It also clearly communicates that "good enough ain't," that tough standards are in every step of your gunnery preps.

6) Drill calibration and zeroing. Make a checklist that everyone follows by the number. Watch for talk like, "Don't matter if you calibrate right, that's what the MRS is for...." or "It's a waste of time zeroing your machine guns. Any damn fool knows only way to hit your target is to walk it in, so why bother?..." You can take this to the bank: the unit that gets flustered or hurried here or the unit that glosses over problems with "tricks of the trade" from tanker lore — the unit that doesn't enforce the strictest adherence to basics — is the unit that will struggle through gunnery and will cause more gray hairs and ulcers than bungee cord jumping. MSG Clary mimeographed a detailed, by-the-numbers sequence for calibration and zero that he forced each crew to follow and that he followed religiously as he personally checked each tank crew. Never deviated or trusted his memory. Fifty-three out of 54 tanks first-run qualified with ammunition to spare kind of speaks for itself.

7) And don't forget the time honored — and proven — maxim that he who teaches knows best. Make your tank commanders and gunners teach classes. This not only benefits knowledge but cohesion and esprit, too. As with all things, do this correctly or you can create a demoralizing "mickey mouse" monster, too. Still, it's a good way to get frozen crews unfrozen as they review the basics preparing for class.

b. Tie rewards and punishments to the above. Enough said earlier!

c. Train by tank crews, not tank crewmen. Again, tank crews are primary groups. Encourage tank crew independence and cohesion. And don't forget the tank is an equal member of the team. Lack of confidence in their tank can destroy a crew as surely as lack of confidence in any crewmember. Encourage total — men and machine — tightness/cohesion because, as all tankers know, gunnery is a marriage of blood, sweat, and metal; it's not a solo challenge. So, focus on crews, not crewmen — and include the tank in the battle roster.

d. Yes, encourage hype. Just make sure it's rooted in solid professional pride that comes from having proven oneself and not the boasting and bragging of "wannabes" too lazy to work or those with a "too cool to care" philosophy. A solid indicator of successful gunnery programs is that you will see hype incidental to esprit and not esprit incidental to hype.

Third, watch the types, amounts, and timing of the stress you produce.

Winning teams need stress; they need to feel the pressure of competition. That competition can be against other crews or against their own internal standards. Frozen crews are understressed. That is, they have something that dampens their motivational drives, even though their hype might have you believe otherwise. In the case of frozen crews, hype is a defensive mechanism meant to ward off "do-gooders." So, you need to stimulate. Healthy, focused professional competition against a standard is the best thing going.

But there is an upper limit to performance. Remember Pareto's principle, i.e., the final 20 percent of performance increase will take 80 percent of available effort. That is, measure the gains you will get against effort expended. Sometimes it just isn't worth it. Your energy might be better spent on some weak area that will gain big benefits with minimal effort. Frozen groups are more likely to invest in such efforts.

Also, there is a real cap on performance. If you try to push tank crews beyond their capabilities or beyond what they believe is reasonable, then you produce some destructive stress in the form of frustration. Look at Zajonc's curve[3] as it maps the relationship of stress to performance:
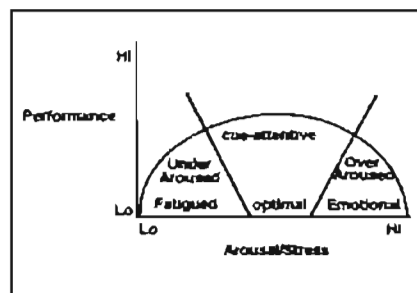
Looking at this curve, two things come to mind:

First, if your program gets people uptight, i.e., they spend more time trying to cope with your gunnery train-up program than actually developing, then you lose more than you gain. The first step to pushing people into the emotional end of the curve is asking them to do things that they don't see a pay-off in, or that don't make sense considering the return on investment. Simply put, people can only do so much in a given block of time. Trying to do more only frustrates them.

An important consideration: as training progresses, crews can do more in less time. Therefore, good programs accelerate based on improvements in abilities, not by the number of days that have passed on the calendar.

Second, crews get into the low end of the curve with either too much rest or not enough. The best crews can wear out if pushed hard. Still, you don't do anybody any favors by constantly resting up your crews every time they start to drag. Too much rest and they become lazy and unconditioned. Good crews need challenge, not coddling. As one SGM Juan Garcia used to say, "We grow through adversity." A corollary born of experience: "Too much adversity for too long or too early can destroy the unconditioned." Set a hard pace but not one that wears them out.

Fourth, set clear goals and a clear plan to achieve them; do goal planning.

Goal planning — setting goals and developing a plan to achieve them — is a must. Too many commanders feel they have done their duty by defining goals in terms of "mission type orders" like "Qualify all crews at X Gunnery." Although mission type orders are great on the battlefield, where maximum flexibility in the face of uncertainty can mean the difference between success and failure, loose training programs only tend to meander, squandering precious resources in the process. Training to standard normally means a very structured environment that demands some excruciatingly detailed planning has to take place. When you fail to put your goals through the rigorous critical thinking that comes with goal planning, you fail to recognize, much less address, the stymy-

ing things that will cause failure: resource constraints, level of crew ability, etc. Further, good goals combined with good planning is more palatable and more likely bought into. Good goals without planning (guidance) often put people in a "can't get there from here" frame of mind because they become focused on the magnitude of effort the goals represent rather than using a plan to put each into proper perspective. In other words, they lose the forest for the trees and get lost and overwhelmed in the process.

A couple of proven dynamics comes into play once you do some well thought out goal-setting and planning; i.e., goal planning:

a. First, it sets the stage for success. Look at this model developed at the now defunct U.S. Army Organizational Effectiveness School:

This model shows that — as the commander plays a role as strategist, i.e., builds the campaign plan for a successful gunnery — he must make sure he is clear in both his desired outcomes and intermediate goals. If not, then he will gain either conflict or confusion or — worst — failure. Still, he can be crystal clear, and if he does not ensure he has competent crews, he will get either wasted resources or, again, failure. So, the commander must do goal planning that is both clear and within the capabilities of the tank crew. "Cookie cutter plans" — plans not tailored to a unit's capabilities and readiness — will often result in failure because the goals are not "clear," i.e., have confusing and frustrating waste or are beyond the comprehension or execution ability of the crews.

b. Second, clear goal planning helps commanders guard against a temptation that lies in having winning crews: to let those crews go and merely ride their coattails. Commanders who elect this option often find themselves in some bizarre travel stops. As Will Rogers said, "If you don't know where you are going, any road will get you there." I don't need to tell anyone who has been to more than one gunnery that there exists in our fine Armor force tank crews that are perfectly capable of finding imaginatively disingenuous routes to gunnery. And commanders who are along for the ride deserve every bit of the embarrassment and humiliation they get as they try to hack and squirm their way out the "brave new worlds" they find.

c. Third, clear goal planning creates a complete-the-dot challenge. People love puzzles. Look at the picture below. What is it?

Most of you said "circle" rather than "a series of dots arranged in circular fashion." There are lots of reasons why this happens but, for this discussion, the key reason is that human beings have great tendency to complete things, to fulfill or prove their perceptions. This comes from a lifetime of taking thousands of bits of perceptual cues every instant and quickly distilling from chaos a simplistic, orderly impression of the world. Management by objectives or MBO was rooted in great part in this human propensity. So, if you have a plan that shows a pretty complete picture of the future success, one that only lacks their abilities and work to be completed, you make it more likely that gunnery preps will proceed smoothly. You have removed a potential roadblock to performance, i.e., your crews trying to figure out how to get "there" from "here" and you have presented a challenge that lies implicitly in your plan.

c. Finally, goal planning causes the important dynamics found in "futuring" or visualization. Simply put, the more detailed the commander paints the end state he wants, and the steps it will take to get there, the more he enables his crews to rehearse — mentally or physically. This concept has been proven in preparing world class athletes: the more you can visualize an activity in detail, the more likely you will do very well at it. And if you throw in something called "inoculation,"[4] that is to tell crews of potential hardships and trials so they can mentally (or physically) condition themselves for the adversity they will find, then you have created a tremendous tool for success. One of my brigade commanders captured it in one of his six "rules": "Don't ever go where you haven't been before." This applies equally to your crews.

Some final words of caution:

Don't micromanage; don't ride herd too much or it becomes "your" program versus "our" program. Riding crews too hard only puts you in the position of pushing versus leading.

You don't have all the answers. Let your subordinates play in the planning. Make it "our" plan versus "my" or "your" plan.

Don't go for the top score. Go for maximizing your potential. The top score will come.

Finally, remember that the weakest link or crew is the true measure of your unit. That is, don't fall prey to the idea that enough top achievers will bury the impacts of substandard crews. Focusing on top crews at the expense of writing off weak crews is throwing away combat potential. And that weak crew will keep alive the very real possibility of your unit failing under pressure — on the gunnery range or on the battlefield. Or look at it another way. If every crew is trained to a point that there is no doubt that each will qualify "first run," what are the chances that your unit will be "top gun"? Pretty good, I think.

And isn't that really the bottom line of gunnery: making sure that every tank will put steel on target... first; or, in the paraphrased words of our CSA, that every crew, our *soldiers*, will leave each battle a VETERAN.

Notes

[1]Gellerman, Saul, *Motivation and Productivity*, AMACOM, 1963.

[2]Associates of the Office of Military Leadership, United States Military Academy, Editors, *A Study of Organizational Leadership*, Stackpole Books, 1976.

[3]Hammer, Clay, and Organ, *Organizational Behavior*, Business Publications, 1978.

[4]Associates of the Office of Military Leadership, United States Military Academy, Editors, *A Study of Organizational Leadership*, Stackpole Books, 1976.

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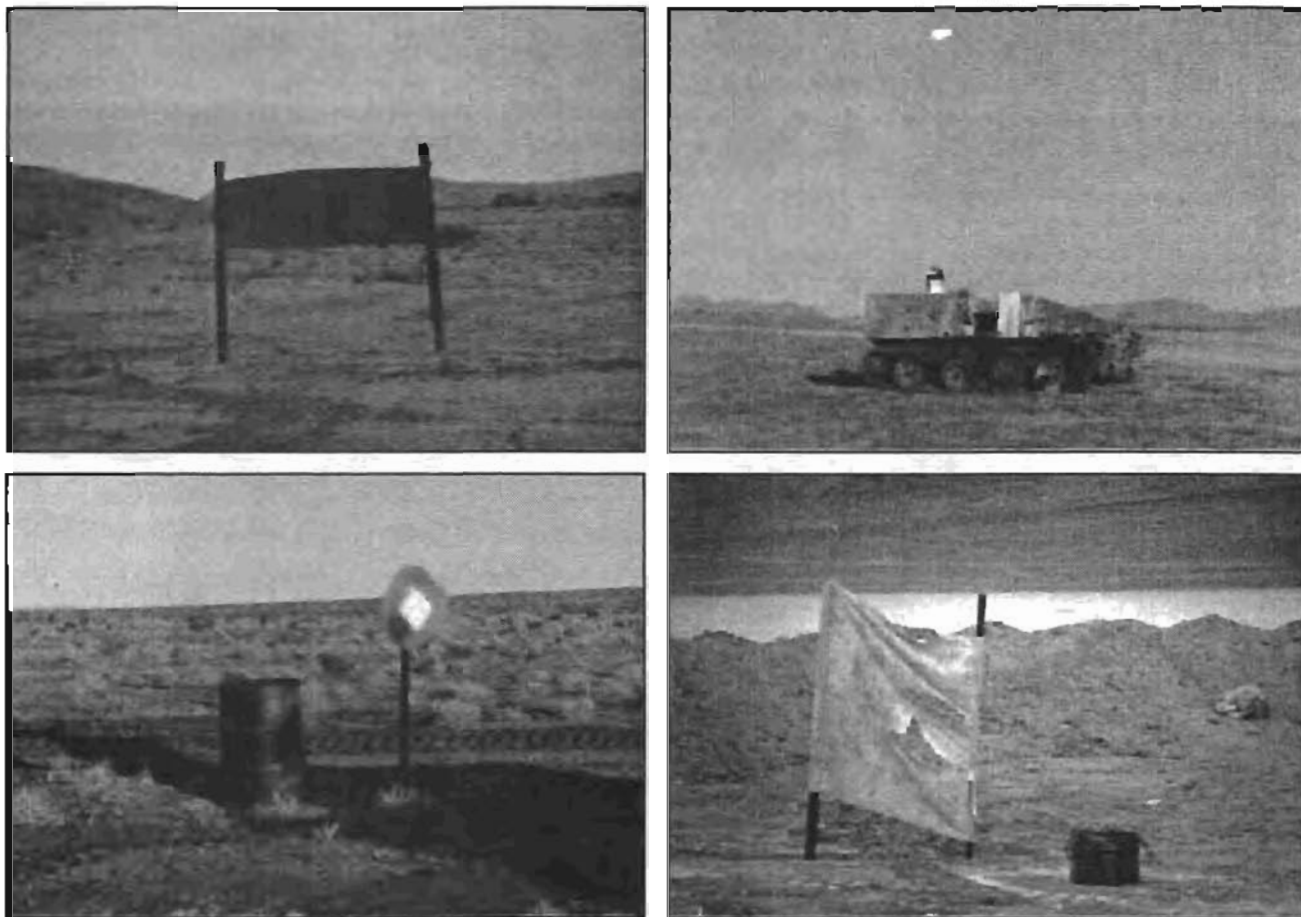
Figure 1. Typical target reference points — the variety seems unlimited, but usefulness is another question.

Marking the Battlefield

by Major Mike Prevou

Until recently, marking an engagement area with target reference points (TRPs) was a catch-as-catch-can proposition. Anything from burning fuel in ammo cans to spray painted bed sheets to numbers on sheets of plywood have appeared at the CTCs and in the deserts of Saudi Arabia (Figure 1). Each requires maintenance and usually only satisfies the need of one visual spectrum (day, night passive, thermal). Remember the days of sending the tank crew out to relight the TRP at 0200, only to have them fall victim to their own minefield? At last, technology has caught up with our needs in the development of the Bat-

tlefield Reference Marking Systems (BRMS).

BRMS (pronounced "brims") (Figure 2) are 4 foot-by-4 foot command and control panels that provide a daytime (dayglow orange), night passive (chemical light), and thermal (no-power thermal paper) signature, all in one neat package that is large enough to be seen well beyond effective weapons ranges. BRMS are currently in use by a number of U.S. Army units purchased as a non-developmental item and are currently available through local procurement. According to members of the 3d Brigade, 4ID,

who have used the panels at home station and the NTC, the BRMS panels are easy to set up, require no maintenance and are clearly visible both through the GPS and TIS. They are most helpful to the leaders as they divide the engagement area and assign sectors of fire. BRMS panels have many additional uses in addition to TRPs.

While each unit is using BRMS panels for the same functions, no unit is using them the same way. As BRMS panels become more widely used, a need for standardization will be critical if units expect to work together

side by side, conduct relief in place, or follow and support. This article is an attempt to suggest various techniques for the employment of BRMS panels, to stimulate discussion, and in the future, provide a framework for written doctrine in our tactical manuals.

First a little background. What is a Battlefield Reference Marking System panel? BRMS panels provide a solution to our need for a highly visible object in all vision spectrums to enhance the command and control of our heavy and, in some cases, light forces.

BRMS panels come in three types (Figure 3), each with a distinctive no-power thermal signature which shows up in the thermal sights as the reverse

Figure 2. New BRMS panels have a daylight, night passive, and thermal signature.
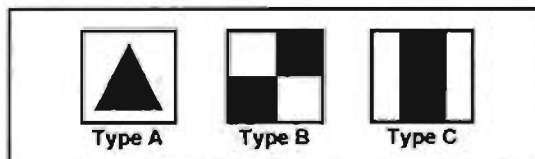

Type A   Type B   Type C

Figure 3. The three types of BRMS panels.

of the polarity selected. If you are in white hot, the panel shows up black. This prevents you from mistaking it as another vehicle and eliminates much confusion on a dirty battlefield (Figure 4).

Each panel has elastic loops in which up to four chemical lights can be affixed to provide passive recognition. The dayglow orange surface surrounding the dark green no-power thermal paper makes the panel easy to see with the naked eye out to about 3500 meters. With binoculars and vehicle sights, I have seen it used out to 6 km, however, the no-power signature is reduced beyond 3500 meters using tank and Bradley sights. I am told that an Apache helicopter can acquire the no-power thermal signature at about 7 km.

These panels are made of nylon rip-stop and are designed to be suspended between two engineer pickets. The

back of the BRMS panel offers a unique flap system to change the camouflage pattern from desert to woodland in seconds. This makes the panel versatile for any unit and prevents the enemy from identifying the panel beyond about 300-400 meters, too late to help him. When folded into its attached storage pouch, it measures 23"x 17"x 4" and weighs just over 2 lb.

BRMS panels can be used as TRPs, field expedient boresighting devices, lane markers for obstacles, passage point markers, traffic control point markers, LZ, DZ or PZ markers, clear building markers in a MOUT environment and, most importantly, as a recognition signal, to reduce fratricide.

As a target reference point, BRMS panels offer our forces the first true TRP marker to assist commanders in controlling direct and indirect fires. In addition to TRPs they are effective as trigger lines, maximum engagement range markers and artillery target markers. The triangle on the Type A BRMS panel allows one panel to represent four distinct units simply by

rotating the panel 90 degrees and changing the point of the triangle. A unit SOP should be established using all three panels. A sample SOP is shown at Figure 5.

The TF commander decides where he wants to kill the enemy and emplaces a type B BRMS as TF TRP 1. He then positions TM A and C to fire into the engagement area using the TF TRP as the point on which to mass fires. TM A and C both place their own TRPs in the EA. Team C is responsible for initiation of indirect fires and places an artillery trigger line marker forward of the EA. (figure 6). Using an SOP similar to the one de-

Figure 4. Type A panel as seen through thermal viewer.
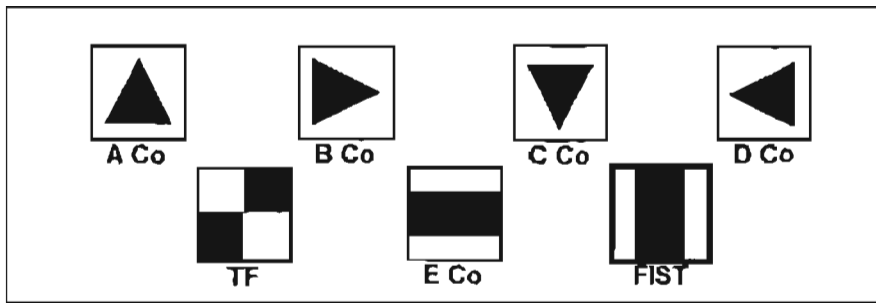
Figure 5. A unit SOP for designating subunits with BRMS panels.

scribed above the commanders can mass and shift fires using the reference points under any battlefield condition.

As a lane marker, BRMS type A panels can be placed along the approach to a cleared lane in an obstacle using the directional triangle to guide follow-on forces to the point of the breach (Figure 7). A similar system can be used for marking passage lanes by adding a type B 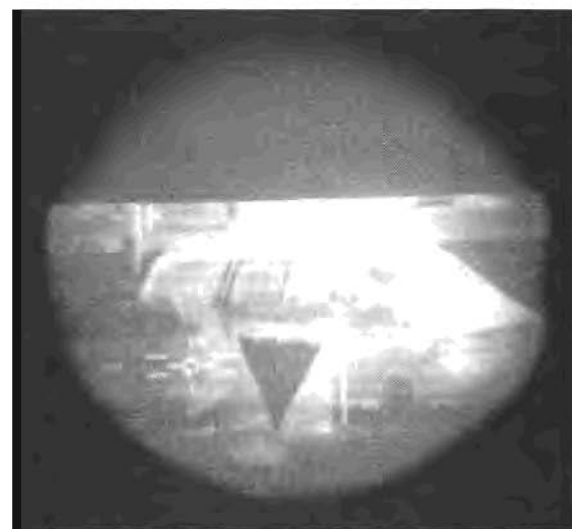BRMS panel to designate the beginning or contact point and a type C to designate the end of the lane or passage point. On road marches BRMS type A panels can be used to point the direction of travel and mark SPs, RPs and TCPs if needed (Figure 8).

BRMS type B panels can be used for field boresighting in an assembly area or from the battle position. The folded size of the BRMS panels makes it much more convenient than carrying around a sheet of plywood and the visual acuity produced by the dark-green on dayglow orange is better than most black and white panels.

To assist in fratricide prevention, any BRMS panel designated in the operations order can be placed on lead and trail vehicles during passages of lines, atop vehicles during close air support missions to mark friendly positions, and on the rear of combat vehicles while in defensive positions to indicate friendly forces. The no-power thermal panel on each panel appears in the reverse of the polarity selected

on the sight, clearly distinguishing the panel from the vehicle upon which it is attached.

In a MOUT environment, during offensive operations, panels can be draped over window sills or tacked to buildings to indicate they are clear, or that they are occupied by friendly forces in a defensive situation (Figure 9).

BRMS panels can be used to mark anything the commander feels need be marked. Aside from those areas already discussed, BRMS panels can mark drop zones, landing zones, pickup zones, cleared bunkers, LOGPAC sites, obstacles, checkpoints, contact points, vehicle collection points, and so on. The high-visibility dayglow orange makes them visible from twice the distance of a VS-17 panel and their thermal signature provides a capability the VS-17 never had. Once they are employed, there is no maintenance required to keep the thermal signature "lit."

Figure 6. BRMS panel placement as TRPs.
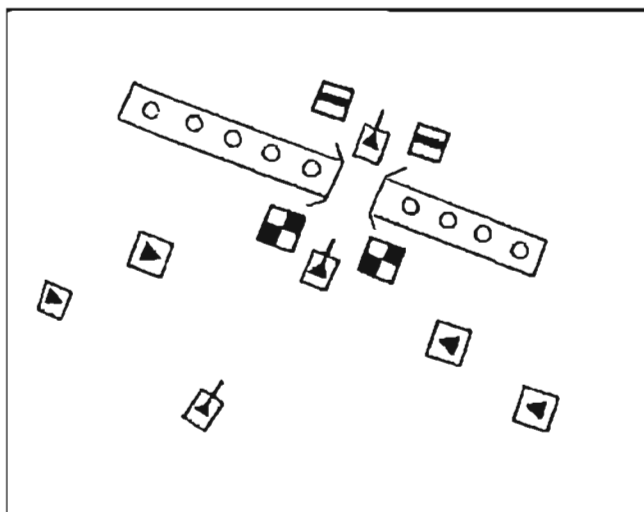
Figure 7. Panel placement to guide unit through a breach.
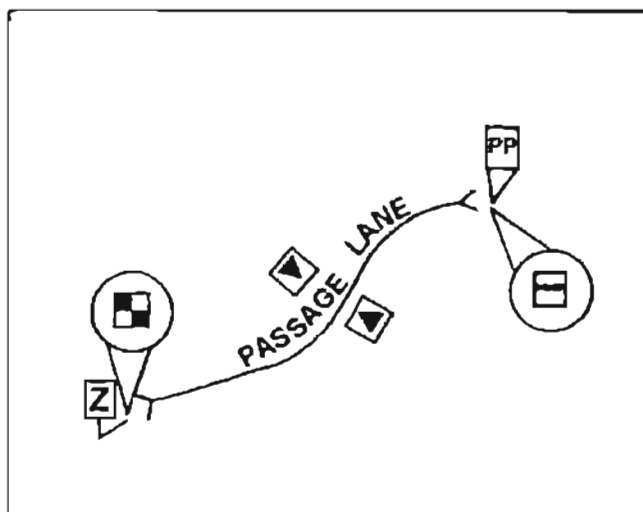
Figure 8. Marking a passage lane with BRMS panels.

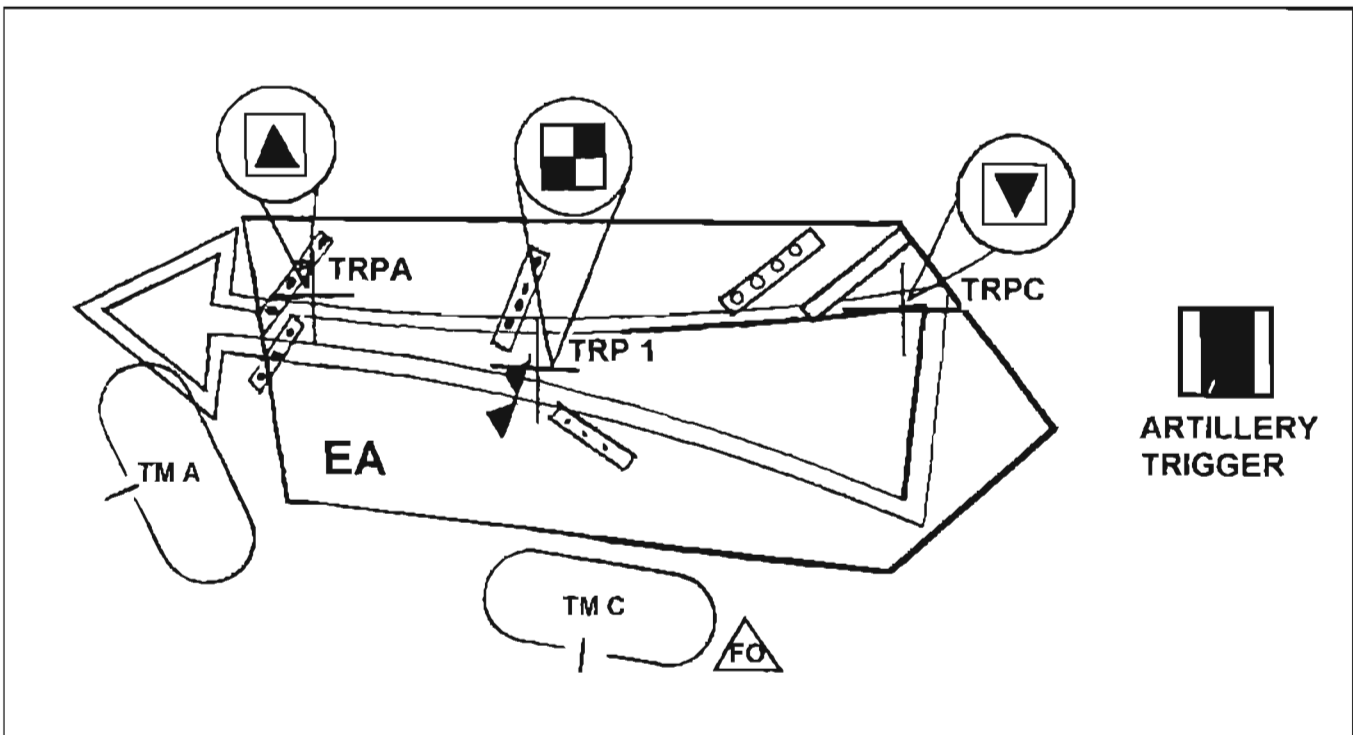A basis of issue for BRMS panels should be one type A panel per combat vehicle, to include scouts. Each antitank M3, ITV, HMMWV or TOW vehicle should carry two type C panels. Battalion and company commanders should each carry a minimum of three type B panels in their HMMWVs (company commanders are often asked to establish or set up a battalion TRP), and fire support officers should have at least three type C panels on their FIST-V. Engineer squad carriers (M113s), Stinger fighting vehicles and other combat support and CSS vehicles, like the first sergeant's, should also carry a complement of the panels to be used as previously discussed. During training, the panels would be recoverable, and since they appear to be rather durable, only few replacement panels would be needed. For actual combat operations, a war stock of an additional basic load would provide replacements to those not recovered.

According to SFC Ricardo Castillo of the Mounted Warfighting Battle Lab at Ft. Knox, who has proponency for BRMS, the panels are currently going through a demonstration-of-use test and will be made available to units rotating through the NTC beginning in April 1994. COL David L. Porter, Director of the MWBL, said that these panels provide an inexpensive solution to a long existing problem and are an example of how the battlelabs are working with industry to develop solutions and put usable products in the hands of soldiers. As BRMS panels become more widely used, the next logical step will be to incorporate the various panels into simulations like COFT and SIMNET.

BRMS panels appear to be a dramatic improvement over the items we currently use for marking the battlefield. Their high visibility in daylight and strong distinctive thermal signature gives the mechanized forces an inexpensive, no-maintenance battlefield reference marking system. I highly encourage our branch school doctrine writers to incorporate their use into future doctrine and standardize our operating procedures as their use becomes more widespread.
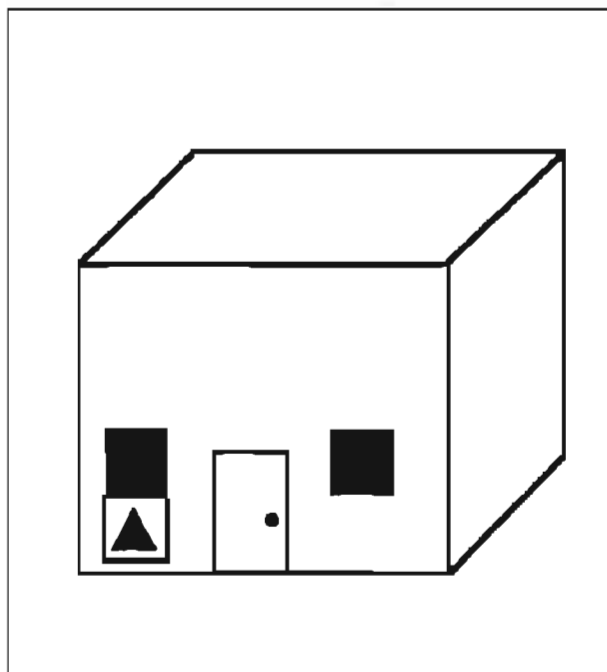
Figure 9. Using panel to mark a building in a MOUT situation.

Major Mike Prevou, a distinguished military graduate of the University of Tennessee - Chattanooga in 1981, served as a junior officer in the 40th Armor, Berlin Brigade, and later as an infantry antitank, motorized infantry, and tank company commander with the 9th ID and I Corps. He has also been an observer/controller at the NTC, a small group instructor at the Armor Advanced Course, and S3 of the 16th Cavalry, Fort Knox. He is currently attending CGSC.

What If?...

How an IVIS-equipped M1A2 force Might have made a difference In twelve DESERT STORM incidents

by David C. Nilsen

This article comes from an unusual source. The author, David C. Nilsen, is the chief game designer for GDW Games in Bloomington, Illinois. Although he has never been in the military, his job requires extensive study of tactics, strategy, and weapons and their characteristics in order to create realistic wargame scenarios. We believe that his imaginative exploration of an IVIS-equipped DESERT STORM force would be of interest to our readers, many of them veterans of these recent battles who now confront the promise of the IVIS Revolution. — The Editor
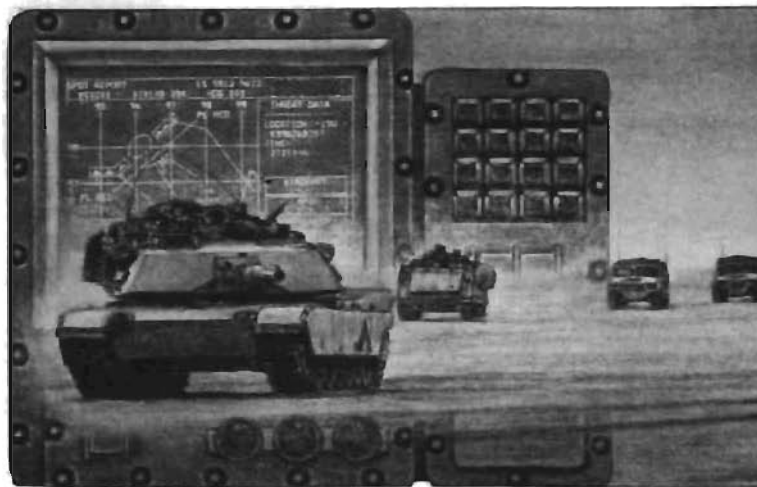
For the purposes of the following preliminary analysis, I will attribute the following set of capabilities to the IVIS system. Some of these capabilities already exist, while others are notional concepts that could be reasonably added to the system in the near- to middle-future. Because this is not a technical status report, but rather a thought piece, I believe these latter concepts are worth discussing.

1) For each vehicle so equipped, the system provides an electronic map showing the GPS/POSNAV-calculated location of every friendly unit included in the system, overlaid on all known terrain features. These maps also include all control measures such as unit boundaries, phase lines, way points, LOAs, etc. These maps are frequently updated across the entire organization via SINCGARS burst transmissions so that these maps are effectively real time representations shared by the entire force.

2) These maps permit commanders to add new graphics and key points of interest as needed, which are updated onto the maps of the force.

3) The system allows enemy positions to be added to these same maps by placing position reports onto known terrain features, or by vehicles equipped with laser rangefinders where the act of lasing the target allows the GPS/IVIS system to place the enemy location.

4) Requests for artillery fire are sent in TACFIRE format by the IVIS system. While these currently go to the company FSO and are then passed up the line using existing procedures, the IVIS architecture should allow further streamlining of the procedure in the future. With the precise knowledge of own unit locations plus enemy unit locations noted above, artillery fire may be assigned with much greater speed. When this is coupled with the capabilities of the new M109A6 Paladin to rapidly fire from the move without time-consuming surveying, precise artillery fire can be brought in with very little delay, without requiring the artillery force to remain stationary and fall behind the close combat forces.

5) Included with the periodic burst transmission updates are reports on ammunition and fuel status which are forwarded directly to the appropriate organizations so that supply needs may be anticipated across the force.

6) Finally, we will assume that SINCGARS is not being effectively countermeasured by the Iraqis so that the transmission system works as intended. We will also assume that GPS is not degraded in any way, as GPS is a crucial component of the IVIS system. Although IVIS directly uses the POSNAV system, rapidly moving units require periodic GPS updates to correct for POSNAV "slippage." As the shared vision of "perfect" location data is the crucial advantage of IVIS, it requires access to the best available positioning data (via these updates) to achieve its best performance.

Presumably, price will prevent the system from extending to every vehicle fielded by the Army, but I am firmly of the opinion that to be used properly, IVIS must be in every close combat vehicle (and not just in platoon or company commanders' vehicles as some have suggested — see "M1A2 Tank Distribution," in March-April 1994) to provide its true revolutionary force multiplying benefits.

In order to examine the use of such a "full-up" IVIS system, we will imagine that US Army units in SWA were equipped with M1A2s and M109A6s, plus the following IVIS-equipped vehicles:

Close Combat Units - All M2 and M3 Bradley Fighting Vehicles; M106 mortar vehicles; M113 and M577 Command/TOC vehicles

Army Aviation - OH-58 C/Ds; AH-1Fs; AH-64As; EH-60s; UH-60 command ships, if not all UH-60s; IVIS sets located at each FARP

Engineers - M728 CEVs; M9 ACEs; MICLIC vehicles, whether AVLM or towed in trailers. Presumably units will have some sort of "float" IVIS units that can be placed at important foci of effort to provide IVIS benefits without the prohibitive and pointless expense of putting a system on every bulldozer, backhoe, and scraper. I would imagine that if a situation required that the location of each and every non-IVIS vehicle be placed in the system, such float units could have a lasing capability similar to the M1A2 where friendly units are placed into the system by being laser designated.

ADA - Vulcans; Stinger Team vehicles

Field Artillery - All firing vehicles (plus some system for integrating towed guns, presumably in a 5-ton prime mover, say, one per firing platoon?); FISTVs; M577 headquarters, TOCs, FDCs and TACFIRE shelters

Again, there ought to be IVIS systems suitably placed to show where ammo tracks and HEMTTs are without having to put IVIS into each individual vehicle.

Logistics Vehicles (Battalion trains plus FSBs) - Here again the issue is to be able to show on the IVIS system where the trains are in general, without the expense of an IVIS on each and every truck, as well as allowing the trains to see where the combat units are. This is currently being accomplished with lightweight computer units (LCUs) using the B2C2 (Brigade and Below Command and Control) system in these support units. However, the current configuration may only allow the LCU user to see IVIS-equipped units, without making the LCU-equipped units show up on the IVIS screens. Whatever system is ultimately used (i.e., a full-up IVIS or an IVIS-compatible LCU), it must work both ways, displaying other friendly unit locations on the LCU, as well as sending the LCU's location into the IVIS net. The best way to do this, I would think, is to have these systems in the HMMWVs (or whatever) of the officers and senior NCOs in charge of the various sub-units. There ought to be an IVIS located with each of the lowest CSS increments which will move or operate independently.

Additional IVIS Placement - Higher-level headquarters must be on the net, but need not (and perhaps ought not) have a system that shows the location of each vehicle. Because of the scope of their view, higher headquarters might require a slightly different map system which allows larger areas to be viewed at a time, with the option to zoom in on points of interest. At various levels of resolution, such maps might show locations of only company commander's vehicles, scout platoon commander's vehicles, battalion TOCs, FA battery FDCs concentration of log units, and so on.

(This is not, strictly speaking, IVIS, as it is inter-echelon rather than inter-vehicle. However, it is the logical extension of the IVIS concept and is the sort of thing that could and should be layered onto such a flexible system once the electronic architecture is in place.

These "commanders' sets" should ideally have an additional capability to send each other John Madden-style X and O and line and arrow overlay diagrams in near real time to assist in communicating concepts and intents. This would be a separate layer from the stuff that is actually updated onto everybody's screen so that everyone else's map doesn't get crapped up with all that notional goop. This is not a capability of current generation IVIS, but is a perfect example of what the mature IVIS or IVIS follow-on ought to allow.
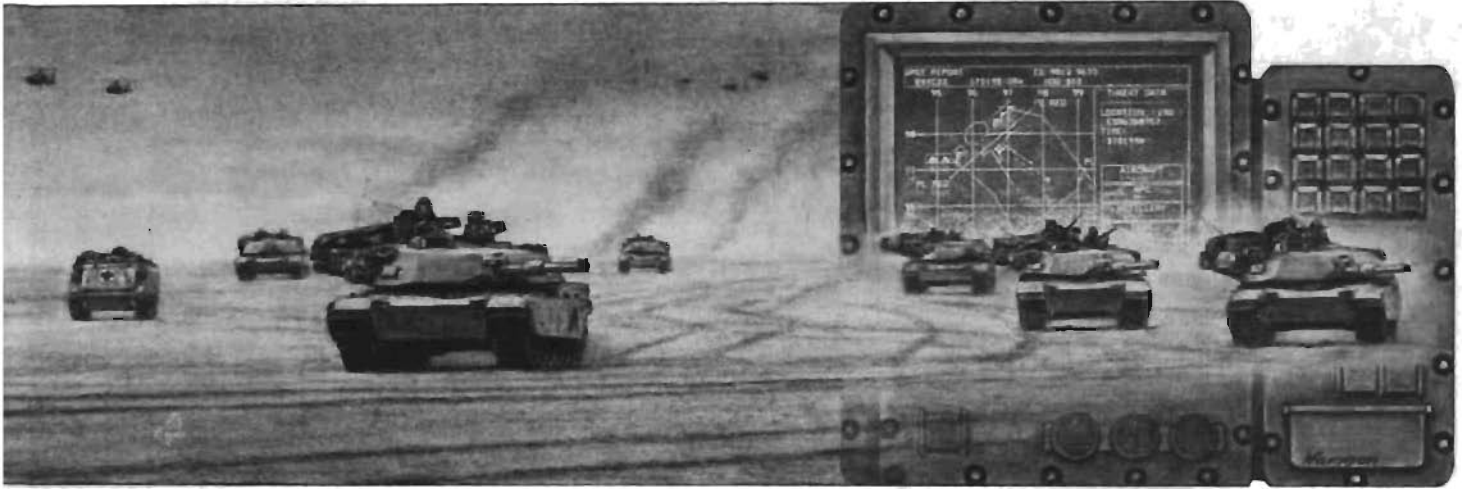
Selected Desert Storm Incidents

1-1 Aviation Pre-war Fratricide incident

Event: On the morning of 17 February (G-7), both 1ID and 1CD had two battalions deployed across the border berm to establish a security zone in Iraqi territory (1-4 CAV and 1-41 IN for 1ID [latter actually 2AD FWD], and 2-5 and 2-8 CAV for 1CD). Both 1ID and 1CD units had reported seeing vehicles moving to their front, which in retrospect were probably each other.

At approximately midnight, a 1ID unit fired on the units it was observing. At about this time, the forward 1CD units reported receiving fire. A little over an hour later (0110), in response to these incidents, an AH-64 flown by the 1-1 Aviation's CO fired Hellfires, destroying two vehicles of the 1-41 IN (one M3, one M113). Two soldiers were killed and six were wounded. It is interesting to note that over an hour was available for officers of the neighboring divisions to attempt to sort the situation out by hand, but this proved to be insufficient time to prevent the subsequent lethal actions.[1]

With IVIS: This incident took place at night, on a division boundary with its separate chains of communication, and within enemy territory. It is not, strictly speaking, surprising that such a thing occurred. Had the force been equipped with IVIS, this incident would almost certainly not have happened, *with the following stipulation:* that IVIS information is fully shared across division lines.

This incident raises the important question: within which echelons is IVIS information shared and disseminated? Certainly within a brigade and presumably within a division, but if IVIS information from separate divisions is not shared and disseminated down to their lowest levels, IVIS could not necessarily have prevented this event. (The issue here is the architecture of the FM radio net. It is not currently set up to provide broad information-sharing across unit boundaries. But I would argue that for IVIS to achieve its fullest potential, this sort of information-sharing must be allowed for, which may require a rethinking of how radio nets are configured and used.)

However, assuming that neighboring divisions have as clear a picture of each others forces as those forces themselves have, it should have been relatively easy for the 1CD and 1ID units to be precisely aware of their own and neighboring units' front line traces, unit boundaries, and the locations of individual combat vehicles (the M3 that was hit would certainly have had an IVIS set).

There is another interesting facet of this engagement. Only two weeks earlier, on 1 February, when 1-4 CAV was operating with 1-1 AVN, the 1-1 CO (the same officer who fired the Hellfires) reported that he had locked onto a ZSU-23-4 antiaircraft vehicle. The 1-4 CAV CO was able to plot this position and establish that this was one of 1-4's ground surveillance radars (GSR) and called a cease-fire. (The rapidity with which the cavalry commander was able to assess and prevent a potentially dangerous situation — also during this period a 1-4 unit received machine gun fire, adding to the confusion — shows the effectiveness of unity of command in complex operations even without IVIS, and again demonstrates the importance of sharing IVIS data where there is not unity of command.) Following this incident, it was determined that under certain conditions the GSR's signal can be identified as a ZSU-23-4 radar by the ECM equipment aboard the AH-64. For this reason, 1-4 CAV began shutting down their GSRs whenever AH-64s were in the area to avoid being misidentified.[2]

Several issues present themselves:

1) The loss of GSR capability whenever friendly Army aviation is overhead is a problem, as it would be best to coordinate such capabilities, not choose one or the other.

2) The fact that 1-4 CAV learned this lesson by accident begs the question of how many other times this almost happened to other units in the theater who did not have the benefit of this experience.

3) The soldiers killed on the 17th were members of 1-41's GSR team,[3] which makes one wonder if the 1-1 Aviation CO thought he was locked up by a ZSU-23-4 when he fired his Hellfires.

IVIS would not solve any of these issues by itself, but would assist in sorting them out before irrevocable action need be taken. The three points above are addressed in order: 1) GSRs could have been used if the ground troops had been able to establish an SOP with AH-64 units in which the Apaches would be able to use their IVIS to be aware of where the GSRs were set up, and disregard ZSU-23-4 indications from those locations.

2) Other units who were not aware of the potential GSR/ZSU confusion would at least have had the reality check of being able to look at their IVIS screen and notice that the ZSU was strangely co-located with a friendly GSR before they loosed their missiles.

3) This last one is tough, because if the pilot feels he is in a kill-or-be-killed situation, he is less likely to study his IVIS screen, but the fact is that the IVIS would be there as a final chance to double-check the situation.

3d ACR Fratricide Incident

Event: During the night of 26-27 February (G+2/3), the 3d ACR was advancing east near the east-west XVIII Airborne Corps-VII Corps boundary on its way to take the Al Busayyah North East airfield (Objective Tim). Just across the corps boundary, in the VII Corps sector, a group of engineers from 1AD were at the Umm Hujul airfield awaiting assistance for a broken-down M548 (the other engineer vehicles consisted of a HMMWV and an excavator). These engineers had been left behind to clear the airfield following 1AD's taking of nearby Al Busayyah earlier that day.

Although 3d ACR found Al Busayyah NE abandoned, its southernmost squadron, 3d Squadron, spotted some activity at the extreme southern end of the airfield complex. These were, in fact, the 1AD Engineers, across the corps boundary. Warning shots were fired, and elements of 3d Squadron eventually opened up with 25-mm, killing one engineer and wounding another before the engineers were able to identify themselves.[4]

Although the 3d ACR commander was aware that his unit was operating dangerously close to the corps boundary, and communicated this to his force, in the heat of the moment, it is not clear that the 3d Squadron realized how close they were, or that they were actually firing into the neighboring sector.

With IVIS: Had the forces been equipped with IVIS, this incident may not have happened. Given the parameters at the beginning of the report, the detachment of engineers may not necessarily have had an IVIS set, so may not have shown up on the 3d ACR's IVIS systems. More to the point, IVIS information is not currently intended to be disseminated across corps lines. As discussed above in the example of divisions, it is clearly my position that IVIS data damned well ought to be shared across corps lines. However, the 3d Squadron/3d ACR would have been able to discern that they were right on the corps boundary, which might have enabled them to sort the situation out short of lethal measures. Furthermore, even if the engineers did not have their own IVIS set reporting their position into the net, their location could have been manually added in by their higher headquarters (54th ENG Bn) so that it would have shown up to 3d ACR (and to the recovery units that were going out to find the detachment).

1st AD Clearing Cross-Corps Boundary Arty Fire vs. Adnan Division

Event: On the afternoon of 27 February (G+3), 1AD found itself in repeated skirmishes with the Republican Guard Adnan Division, whose main body was actually in the XVIII Corps sector. Much of this conflict was in the form of exchanges of artillery fire.

At 0930, Iraqi artillery began falling to the rear of the 1AD's 2d Brigade TOC. The DivArty located the firing unit, but as it was in the XVIII Corps sector, had to request permission for a cross-boundary fire. Permission took 39 minutes (which under the circumstances was considered to be rather prompt), and the Iraqi artillery was smothered beneath MLRS and 8" fire.[5]

Very nice, but what if the Iraqis had not been so cooperative? In almost every case, Iraqi artillery only fired (and continue to fire) on pre-registered targets, whether they were occupied or not. American troops were actually able to adopt a fairly blasé attitude toward this fire.[6] Had the Iraqis been firing accurately, those 39 minutes would have been an eternity, and could have annihilated the 2d Brigade TOC. Similarly, had the Iraqis been firing chemical rounds, the blasé attitude would probably not have pertained. Given the fact that the Iraqi Republican Guard formations were equipped with G-5 and GHN-45 guns which could have outranged the U.S. systems if used properly, 39 minutes would have been plenty of time to have lost an artillery duel. Time to out-think and out-execute the enemy is of the essence when one is potentially outranged. Thirty-nine minutes is too long against a competent foe.

With IVIS: One of the reasons given in the accounts for the length of the clearance time was the need to get 3d ACR out of the sector.[7] Such a requirement is meaningful when there is only a very general sense of the relative locations of friendly and enemy forces, as was apparently the case here. Clearly if Adnan artillery battalions were firing, 3d ACR units were not crawling over top of them. IVIS should have been able to significantly shorten the time to provide fire clearance in one of two ways. Assuming that IVIS data is shared across corps lines (again, this echoes the points raised above), both VII and XVIII Airborne Corps would have been aware of the location of 3d ACR with relation to the prospective targets of the 1AD DivArty (located with great precision by the division's Fire Finder radars). Given this capability, I assume that SOPs for clearing cross-boundary fires would be streamlined, and that streamlining would show in very short required times to clear such fires.

Even if IVIS data is not shared across corps lines, once the request arrived at XVIII Corps, IVIS should have allowed them to very rapidly see that 3d ACR was well away from the target, and not in danger of being hit by 1AD's fires. This would have relieved them of the need to move 3d ACR out of the way, and would have also drastically shortened the time to clear the fire request.

2d Brigade, 3d AD Use of Army Aviation and CAS

Event: During the 3d Armored Division's heavy fighting of 26-27 February, the 2d Brigade (the division's main effort) attempted to make heavy use of Army Aviation and Air Force close air support (CAS). CAS efforts, and to a lesser extent Army attack helicopter missions, had their effectiveness significantly reduced due to concerns over possible fratricide: numerous sorties were cancelled or simply wasted. These concerns were a result of poor visibility (night operations and sandstorms) as well as the difficulty in tracking other friendly units (notably the 2d ACR and 1st AD). Brigade air liaison officers rated the use of CAS in direct support of the brigade as "marginal at best," and coordinated activities between Army aviation and the Air

Force was "nearly nonexistent." Most of this was due to concern over fratricide, but some of the difficulty in controlling attack helo operations was the result of inadequate FM radio range.[8]

With Ivis: Obviously, IVIS would not have solved all these woes, but it certainly could have eased the difficulty in tracking the location of friendly forces, and this alone would have greatly enhanced the ability to control aerial assets. More importantly, IVIS sets on the attack battalions' OH-58s and AH-64s would have allowed these forces to conduct autonomous operations, rather than being restricted to external control over unreliable radio links. This self-control capability would have been more effective than requiring them to hover and wait for someone to tell them where to go and what to do.

IVIS would also have assisted Army helicopters in adapting to the localized nature of sandstorms. Sandstorms would rise up rapidly and just as rapidly abate, allowing aircraft to take advantage of these lulls, or holes. Coordinating nearby attack helos to pop in through such holes in the crud is clearly a tricky business, as the helos need to be aware of the location of friendly troops so that, as they pounce through the holes, they can rapidly gain their bearings, hit the enemy, and get out. IVIS would allow these helos to remain oriented on invisible ground units until such time as the storm cover breaks long enough for them to roll in.

Battle of 73 Easting

Event: On 26 February (G+2) at the Battle of 73 Easting (I am using this name to refer to the 2d ACR engagement; 3d AD's battles in this vicinity are referred to as the Battles of Phase Line Tangerine and Phase Line Bullet, and 1st ID's are the Battle of Objective Norfolk or "Fright Night"), G Troop of the 2d ACR found itself astride an Iraqi line of withdrawal and faced retreating Iraqi armor. After having destroyed the Iraqi forces defending in place, the troop found itself facing Iraqi forces moving into their zone from the south. In the midst of this fight, the troop's FISTV lost its thermal sight. The FIST sergeant was now obliged to run to a neighboring BFV to use its thermals to pick out Iraqi targets, and, because the BFV was not on the fire support network, back to his FISTV to actually call in the fire. Against a more formidable foe, this could easily have been the proverbial nail for want of which the horseshoe was lost, etc. As it was, a 155-mm howitzer mission called in by the G Troop FIST is credited with preventing an Iraqi T-72 company from overrunning a platoon of G Troop during the fight.[9]

With IVIS: With IVIS, each M1A2 in the ACR could have called in prompt and accurate artillery fire, eliminating the weak link of one broken down FIST vehicle. As this battle lasted anywhere up to 6 hours (depending upon the unit) before 1st ID was passed through, the value of a redundant ability to call fires, particularly against a more formidable enemy, cannot be overestimated. This is especially true when a unit might unexpectedly find itself astride a major enemy route of advance or retreat and find itself engaged with an effectively self-replenishing enemy. Artillery is crucial to "pre-digest" these columns before they come into direct fire range, to ease the strain on the U.S. units by breaking up and slowing down the flow of the enemy columns (this assumes U.S. forces in position to observe the

approaching Iraqi forces, but with each M1A2 able to call fire, the chances of this improve astronomically).

Confusion during "Fright Night"

Event: During the afternoon of 26 February (G+2), due to dithering on the part of CINCCENT with the ARCENT reserve (1CD), the VII Corps commander was forced to come up with an alternate unit to provide the third division for his three-division "fist." This division was 1ID, which had begun the corps' portion of the campaign by conducting the breach and passing through the British 1AD plus the VII Corps Field Artillery Brigades, and was still engaged in passing through the final elements of the British unit at 0200 that morning. Nonetheless, in order for the "Big Red One" to be in position in time to form part of the heavy fist, it needed to begin moving rapidly, and at 0430 on the 26th, it did.[10]

All day long the division advanced to catch up to 2d ACR, the corps' offensive screening force, all the while making up plans "on the fly." By mid-afternoon, the division's brigade commanders became aware of the mission to conduct a passage of lines through the 2d ACR to attack elements of the RGFC.[11] (Note that although other individuals, notably 2d ACR and VII Corps headquarters, had knowledge of this eventuality, both since the previous day, this was the point at which 1ID's brigade commanders came into the loop, as they were necessarily focused on other matters before that point.)

Planning for this evolution was rushed at best, with some units never getting map overlays for the operation, and even the 1st Brigade's commander had only a brief look at the division's copy of the overlay, which was, in any case, about three weeks old.[12]

1ID's 1st "Devil" Brigade was the left (northern) component of the division's attack that night. The passage of lines was relatively smooth for one of the brigade's battalions, 1-34 Armor, but 2-34, on the brigade's left (northern) flank was unable to find its correct passage point. Once actually engaged, of course, the confusion multiplied. Soon after the passage, two companies of 2-34, while attempting to maneuver to take up stations on the left flank of the battalion, wound up 90° out of line, facing north instead of east. The two companies eventually had to complete a full circle in order to join back up on 2-34's left flank.[13]

As the fight developed, 2-34 found itself engaged with two tank battalions equipped with T-72s, rather than the mechanized battalion they were led to expect. 2-34's execution was deliberate, with all fires being cleared and distributed by unit commanders, with the result that 2-34 was not involved in a single fratricide incident, in contrast with other U.S. units that same night.[14]

However, the ability to use artillery during the 1st Brigade's fight left much to be desired. 2-34 had one fleeting target of four fleeing enemy vehicles, but was unable to get a proper plot with which to call in fire, thanks to limitations of the M981 FISTV.[15] Similarly, the brigade commander reports that due to uncertainty about the location of the 1-4 Cavalry on the brigade's north flank, he was also obliged to forego the use of artillery throughout the night attack.[16]

Nonetheless, the engagement was a complete success, vividly demonstrating the amount of chaos and complication

This T-72 took multiple hits near Battle of Norfolk site.

that can be handled by a well-trained and well-integrated force and encompassed in a one-sided victory.

With IVIS: Although Maggart is absolutely correct in pointing out that the "leap of faith" collectively taken by 1st Brigade's band of brothers at the Battle of Norfolk validated the brigade's concept of team building, the availability of IVIS could have had a profound and beneficial effect on the way that the battle was fought. Bear in mind that this is not to say that the battle was not fought well and successfully. However, by making things easy that had to be done the hard way, IVIS would have freed up more time and attention for additional execution. Like any force-multiplying component, IVIS does not make possible something which was impossible, but allows the possible to be done with greater efficiency, permitting other things to be done as well. I count eight aspects in which IVIS and its associated effects would have been relevant.

First of all, the difficulty of disseminating out-of-date map overlays would have been sidestepped. IVIS would have transmitted the appropriate data directly to the electronic maps in each vehicle. Aside from simple organizational benefits, this would have provided a tremendous boost in confidence at all levels of the 1st Division. Second, execution of the passage of lines through 2d ACR would also have been greatly eased, as IVIS would have provided the ability to orient precisely on the ACR's rear, and locate, close on, and pass through the agreed upon lanes. Third, the difficulties with 2-34's out-of-line companies would have been minimized. It is likely that they would have never broken formation to begin with, given IVIS's constant real-time display of the remaining vehicles of the unit. Even assuming that they had, IVIS would have enabled the companies to electronically see the rest of the battalion and plan and execute their reformation with speed and precision. Contrast this with the fact that the commander of one of the wayward companies had to actually dismount from his tank to use his magnetic compass to establish his orientation.[17] Similarly, earlier in the evening, 2-34 found it difficult to keep station of 1-34's flank, and eventually sorted out the fact that they were guiding on the wrong tank, and changed their orientation accordingly.[18]

Considering the amount of time routinely spent on such "simple" issues, the fact that IVIS helps "simple" things to remain simple allows commanders to spend less time sorting out the little stuff and more time planning and commanding. Against a different enemy which was 1) using superior equipment, 2) better trained in its use, and 3) not merely using the tank batteries to light their bunkers, the importance of these points cannot be overestimated.

Fourth, the calculations and re-orientation necessary to return to their correct positions could have been made independently by the lost companies, without the need for the battalion commander to coordinate them, thereby taking his attention from the remainder of the fight, or to endanger himself by illuminating his position to guide the companies back. The 2-34 commander had to light himself up with flares several times during this night, twice while bringing the missing companies in, and again to show the brigade commander the way to his position. On both these occasions, others observed that every Iraqi system capable of firing opened up on the command tank.[19] It was only bad Iraqi fire control that preserved the commander, but with IVIS providing a clear electronic view of his location to other friendly units, this is a risk that would have been unnecessary. The loss of a battalion commander in the midst of a confusing and rapidly-unfolding ground action could have been catastrophic.

Fifth, the shared view of the location of friendly forces provided by IVIS would have streamlined and sped the allocation of fires while still meeting the strenuous requirement of limiting fratricide. 2-34's restrictive use of fires was explicitly used to reduce the chance of fratricide, and was based on techniques used at the NTC.[20] These were completely effective under the circumstances, but given better opposition, may have given up too much offensive capability. As it was, the troops in 2-34 felt that these rules of engagement were needlessly endangering the force, leaving the opposition too much opportunity to get the first shot in while fires were being allocated and cleared.[21] Even ig-

This T-55 took a TOW hit at the Battle of Norfolk.

noring the greater absolute effectiveness of more rapid fire, the simple increase in confidence among the 2-34 crews resulting from more permissive ROEs by using IVIS would have been worth quite a bit, as confidence permits better performance by minimizing the mental clutter of uncertainty and the perceived need for over-hasty execution.

Sixth, the battalions would have been able to make better use of artillery by using each M1A2's ability to call for fire by simply lasing and burst-transmitting into the TACFIRE queue. This rapid and opportunistic use of fire would have been useful in the example of the fleeing vehicles, and also in suppressing enemy dismounts.

Seventh, the use of artillery on the brigade level would have been enhanced by allowing a clear view of the location of neighboring units (1-4 CAV and 2d AD [FWD]) so that artillery fire could have been plotted without fear of

hitting friendly forces. Eighth and last, IVIS would have permitted more than the separate details above. It would provided the synergistic ability for the brigade to accomplish the above issues in a rapid fashion with better and more clear cross-communication of current situations and future intentions. Brigade and battalion commanders would have had more fine control in using their forces to respond to eventualities, and the entire force would have benefitted from shared perception of the "big picture." While the actual result of the battle was entirely successful, there is no reason not to imagine entire dimensions of enhanced performance with reduced casualties and mission accomplishment with less expenditure of ammunition, fuel, and most importantly, time.

2AD (FWD) at Objective Norfolk

Event: At the same Battle of Objective Norfolk, the right (southern) portion of the 1ID attack was fought by the 2d AD (FWD), operating as 3d Brigade/1ID. Although this brigade also convincingly defeated the Iraqi forces it faced, its performance was altogether less satisfactory than that of the 1st Brigade to its north.

The brigade lost a total of 10 vehicles to fratricide during the engagement, with a total of six killed and 25 or more wounded[22] in three separate engagements. In the first, three Bradleys of TF 1-41 Infantry were hit by units of the same brigade, killing four and wounding 18. In the second, five M1A1s operating with TF 1-41 Infantry (belonging to 3-66 Armor) were hit, again from the same brigade, killing one and wounding one. In the last, two Bradleys, also of 1-41 Infantry, but operating with TF 3-66 Armor, strayed north into the 1st Brigade/1ID zone and were hit by forces of the neighboring brigade, with one soldier killed.[23]

In addition, during the course of the passage of lines through 2d ACR, the brigade's trains bunched up within 150 meters of the combat units, and very nearly became embroiled in combat, with obviously disastrous implications.[24]

With IVIS: It is hard not to imagine how IVIS could have saved several soldiers from death or wounding, although that is easy to say from this distance. It is said that, when viewed through thermal sights, RPGs detonating against the armor of Bradleys look very much like a tank main gun firing, which in two of the cases is what attracted the fire.[25]

The units that erroneously fired at friendly forces would most likely have benefitted from an IVIS view of the location of the forces of the adjoining units to their flanks. Even in the face of apparent enemy tank muzzle flashes, IVIS could have provided enough reasonable doubt to prevent firing until more information had been obtained.

This applies equally well to the intra-brigade and inter-brigade fratricide fire, *assuming that IVIS data is shared across brigade lines.* As we have seen, fratricide is most likely along unit boundaries, whether those boundaries are corps, brigade, or battalion. Any system that breaks down the barriers of accurately perceiving the friendly forces on one's flank can hardly help but drastically reduce the incidence of fratricide. However, the 2d AD would seem to provide another lesson as well. Compared to the disciplined, fratricide-free fire of 2-34 Armor (discussed above), which was learned in realistic simulated combat at the

Orders group of the 1st Brigade, 1ID gathers in the vicinity of PL Plum at 1200 hrs. on 24 Feb.

NTC, the performance of 2d AD (FWD) seems to demonstrate the difficulties encountered by Europe-based units which have no training facility comparable to the NTC. Remember, however, that the cost of 2-34's disciplined fire was the perception that they were placing themselves at risk to enemy counterfire which, against a better foe, might well have been true. Under other circumstances, 2d AD's procedures may well have proved more effective. But the point here is that, under these circumstances, 2-34's procedure *did* pay off, and this was a procedure that was driven home to them specifically at the NTC, an experience 2d AD (FWD) didn't have.

While IVIS would have aided the 1st Brigade in its fight, it would appear that IVIS, like many tools, may provide greater net increases in effectiveness to units early in their training cycles than to units that are already at their peak, having already mastered "the little stuff" that makes such a critical difference in real combat. Given the likelihood that the power projection Army of the future will be called on to rapidly respond to crises without being able to send units fresh from NTC rotations, the value of IVIS looms large indeed.

In the case of the brigade trains coming suddenly upon the edge of the battlefield, IVIS sets present with the officers and NCOs leading the trains would have allowed them a better view of the front lines, and allowed them to keep a better safety cushion between the vulnerable fuelers and ammo haulers and the chaotic night battle.

2AD Logistics Rendezvous

Event: During 1ID's final all-out stretch to cut the Kuwait City-Basra highway, 2-66 Armor of 2AD (FWD) found itself critically low on fuel. The battalion's logistics officer took four HEMTT fuelers out to refuel the tanks. Because the log officer could not make radio contact with the battalion to get them to stop and wait for him, he struck out across the desert to intercept the battalion. As it turned out, he got out ahead of the battalion with the four fuelers and was waiting for them as they crested a rise.

At this point, one of the 2-66 gunners asked if he should take the four unidentified fuel trucks under fire, but was told to identify them first.[26]

With IVIS: As discussed at the beginning, IVIS sets among log units would presumably be assigned to key officers, so the battalion log officer should certainly have had one with his intrepid fuel convoy. With IVIS in both groups, not only should the combat and log elements have been able to find each other via their electronic maps to plan a timely rendezvous, the rendezvous could have been planned so that the fuelers need not have been exposed and defenseless, out ahead of the combat unit. Naturally this should also have prevented the fuelers from being tragically misidentified and destroyed by their own tanks.

Alpha Troop, 4-7 Cav Engagement at PL Bullet

Event: On the evening of 26 February, 4-7 Cavalry was screening ahead of the 3d AD, advancing to engage the Iraqi Republican Guard. Shortly after dark, Alpha Troop made contact with a force of Iraqi tanks and infantry, and combat ensued. During the course of the fighting, two Bradleys were known to have been knocked out. As increasingly more enemy heavy forces were observed by the scouts, it became clear that Alpha Troop, now also low on ammunition, had completed its screening mission and needed to withdraw to allow the division's maneuver forces to engage the enemy. At this time, the troop commander, Captain Davie, decided to check what he assumed were the two knocked-out Bradleys to be sure that none of their crews were left behind as the troop withdrew.

While conducting this check, Davie discovered that there were not two, but four knocked-out Bradleys. He only learned of the two additional vehicles by coming upon them while looking for the other two. All four Bradleys had been evacuated, and Alpha Troop withdrew through the approching 4-34 Armor.[27]

With IVIS: Although the troop commander's unawareness of the additional lost vehicles had no impact on this event, it is not hard to imagine other circumstances where it might have created difficulties. Although the current IVIS system does not call attention to a vehicle that has been hit (the icon of a vehicle that has gone off the air merely remains at its last transmitted position), such a capability is a simple and logical addition. The icon of a vehicle that no longer transmits could be set to flash, or have some sort of flag added to it. This would allow other units to be aware that something was amiss and check to see if the vehicle was a catastrophic kill or merely needed a mechanic.

On the other hand, the IVIS terminal could be fitted with an "I'm Hit" switch that could be activated by the vehicle commander upon abandoning, or which could be activated along with the fire suppression system. This capability would allow rapid medical attention and offer other benefits.

For example, during the 1st AD attack into the Tawakalna Division on the 26th, the command tank of C Company, 1-37 Armor was knocked out. Although the battalion commander was aware of this loss, he was unable to raise the company's XO to have him take over command.[28] Although the company XO was eventually contacted and the outcome of the battle was not affected, the ability of the force to directly monitor the status of friendly vehicles without waiting for reports to find their way to them could allow more rapid recovery of command and control when commanders are killed in combat. Fortunately, neither the

C Company commander, nor in fact any in 1-37, were killed in this engagement.

Sub-optimal Use of Army Aviation

Event: There have been a number of observations since the war that Army Aviation was not used as it ought to have been, as a fully functioning maneuver element. Rather, it was too often used as Army-owned close air support. Consequently, AH-64s sat at their bases waiting to be called in for fire support or assigned deep strike missions, rather than being fully integrated into the battle.

With IVIS: This problem will be difficult to solve because of the very different nature of aviation and ground units. Ground units move relatively slowly, take up space on the ground, and have their supplies brought to them, while aviation units move rapidly, but only temporarily occupy air space before returning to their bases to refuel and rearm.

Fully integrating these conceptually different capabilities will be difficult. However, any system that simplifies the visualization of the size, shape, and changing nature of the battlefield and provides an identical vision of those details to all participants will simplify that integration by allowing these disparate air and ground elements to be meshed in real time, rather than requiring the more difficult task of meshing their rather different planning assumptions without a common view of operations. IVIS provides that crucial connection.

VII Corps Commander

Event: LTG Franks spent a great deal of time travelling the battlefield in his UH-60, "riding the circuit" of his division and ACR commanders to maintain a constant loop of two-way feedback. He used these trips to gain a personal feel for conditions on the battlefield and for his unit commanders' states of mind, as well as to pass on to them details of the developing corps operations. This included physically showing his map to his subordinates, and in some cases drawing maps in the sand to explain his concept of the operations.

With IVIS: The kind of IVIS commanders' features I postulate above would reduce the necessity of some of this effort. While the corps commander will still want to take the measure of his subordinates and communicate his vision by face-to-face meetings during the campaign, if he is relieved of the burden of having to physically show a map to them, the demands on his time are eased. This gives him more time for other issues requiring his attention, and perhaps most importantly, allows him more time to rest.

Rick Swain believes that by the morning of February 28 (G+5), both Franks and his G-3, COL Cherrie, were nearing the end of their productive endurance, and that this had to do with some of the confusion about Safwan being taken vs. being interdicted by air.[29] Had the war gone on for another day or more, the physical and mental limits of the corps commander would have become ever more important. A system which allows the corps commander to more effectively use his time to command, communicate, and remain mentally fresh enhances the effectiveness of the entire corps.

General Franks meets with his VII Corps field commanders.

Sharing the Vision of the Battlefield with the CINC and the NCA

Event: The CINCCENT, General Schwarzkopf, appears to have spent much of the ground war quite exercised about the performance of VII Corps.[30] However, it is quite evident that he had a very inadequate view of the battlefield, which certainly could not have helped his humor.

For example, in the famous phone conversation between the CINC and General Franks on the 26th (G+2), Schwarzkopf unaccountably berates Franks to not turn VII Corps to the south.[31] Without assuming that Schwarzkopf had a completely inaccurate picture of the alignment of forces on the battlefield, it is impossible to understand what he could have had in mind when assuming that VII Corps was in any danger of turning south.[32] Schwarzkopf's fuzzy view of the campaign was compounded when he repeatedly insisted that "the gates are closed" during his "Mother of All Briefings."[33] This effectively amounted to a declaration of victory, and apparently set the tone for the Coalition's cessation of hostilities. Although the war was ended by President Bush after consultation with his advisors and Coalition allies for political reasons, not military reasons, there is every reason to believe that Bush, Cheney, Powell, etc., would have wanted the political decision to dovetail as closely as possible with military realities, had these details been available. There are abundant reasons to believe that Washington did not, for whatever reason, have a very clear picture of the situation on the ground at the time the decision was made to end the war.[34] Although the exact same decision may have been made in any case, it is inarguable that when about to make a decision about the prosecution of a war, the National Command Authority ought to have access to the absolute reality of the military situation.

With IVIS: Assuming a vertical IVIS application that would display the location of ground units to higher headquarters (as postulated at the beginning of this paper), Schwarzkopf could have seen real-time displays of VII Corps, which should have calmed him down on the 26th.

Similarly, the mistaken report that U.S. ground troops had taken Safwan would not have taken place with such an IVIS application, as it was only the erroneous application of a sticky note at VII Corps, 3d Army, or CENTCOM that allowed the misunderstanding to take place. This would have saved Schwarzkopf from offering Safwan as the

cease-fire site, and saved VII Corps and 1ID the headache of, respectively, being accused of lying, and taking Safwan under the cessation of hostilities terms.

We would have additionally been spared the current round of misinformed Monday-morning quarterbacking based on Schwarzkopf's inaccurate battlefield picture, and perhaps history might have been spared from an additional round of the CINC's histrionics.

On a much more important level, given the same vertical IVIS application transmitted to the national level, the President and his advisors would have had an accurate picture of the battlefield in case their political goals required specific ground objectives to be taken. Bush may have wanted another day to close the Basra pocket, or he may have felt that it was unimportant. But at least there could have been an informed debate and an awareness among the decision-makers that the pocket was not closed at 0800 (Gulf time), 28 February (G+5), 1993.

Summary

The collision of the U.S. and Iraqi armed forces in the Gulf War was that of the First World and the Third World. The difference in equipment, training, and strategic and operational expertise of the two sides was an order of magnitude.

Nonetheless, there is still demonstrable room for further improvement in the performance of U.S. forces, and IVIS can arguably answer many of those needs. Assuming a reasonable application of IVIS' current capabilities and reasonable growth of its current baseline, the following capabilities would be addressed:

1) Enhanced situational awareness on the part of all close combat vehicles, which translates into greater flexibility and capability on the battlefield and a tremendous new ability to rapidly and effectively respond to changing situations.

2) Shared vision allows decentralized decisions as the information required for these decisions is uniformly available at lower echelons, thus freeing commanders to do more commanding and less coordinating.

3) Greatly improved ability to avoid fratricide on the battlefield without positive control measures, simply by having real-time access to accurate data on friendly troop locations.

4) More rapid ability to call and clear artillery fires, spread throughout the force with the primary direct fire system (M1A2).

5) Ability to better coordinate logistical support with combat units, through situational awareness of relative locations as well as regular data on actual supply status. This results in the ability to exercise a push supply policy based on accurate anticipation of needs at future times.

6) Provides the tools for better coordination with Army aviation.

7) Provides better integration of vision up and down the chain of command, all the way to the National Command Authority. (Although its name is inter-vehicular information system, which implies that it is a horizontal integration system, IVIS should not only be a horizontal system. In fact, its capabilities demand that once this information is collated for horizontal distribution that it be spread vertically as well.)

Issues

Naturally, none of these improvements will come about without a great deal of thought, testing, training, and revision. Any system as revolutionary as I believe IVIS is contains a great number of unanticipated potentials (good and bad) which will probably be stumbled over as it is tested and broken in.

Some relevant difficulties and issues to be resolved follow.

1) **Cost:** In the post-Bottom Up Review era, money will be hard to come by. It will be very expensive to re-equip the spectrum of vehicles listed at the beginning of this paper, and there will be no shortage of uninformed bean counters who will attempt to cut entire classes of vehicles out of the IVIS loop.

2) **Do Not Surrender the Vision:** As part of the endless rounds of cost-cutting, there will be numerous attempts to truncate the IVIS vision by limiting its application to certain vehicles only. Chief among these is the recurring suggestion that only company commanders or platoon commanders need have M1A2s to enhance their command and control capabilities. *This is a criminal failure of vision,* and must be mercilessly exterminated wherever it arises. IVIS only reaches its full fruition when all units share the common vision of the battlefield. Otherwise large amounts of time must still be pissed away incorporating "blind" units into the world of sight, which wastes the time, energy, and attention that ought to be freed up by IVIS. Yes, selectively issuing IVIS to a few units will improve capabilities, but these improvements will be only arithmetical. The improvements possible if the entire force gets IVIS will be not arithmetical, but *exponential.* Given the expense of even a small application of the program, it is worth the extra cost to get an exponential increase over an arithmetical one.

The same arguments apply to limiting IVIS to only close combat units or any other distinction that you may imagine. The proper vision of IVIS is to have a set at each of the lowest levels of organization that are expected to operate separately (individual vehicles for close combat, groups of vehicles for CSS). Do not surrender this vision.

3) **Outstanding Organizational Issues:** The Army must decide at what level, and across which boundaries, the IVIS data will be shared. It is my opinion that the system works best if information is shared at all levels (certainly cross-boundary fratricide is best prevented, and cross-boundary artillery fires are best cleared, when units can see friendly forces on both sides of the line). However, this will require the Army to rethink the meaning of organizational divisions. If neighboring companies on either side of a corps boundary are able to pass information directly one to the other, what exactly is the role of the corps under these circumstances?

These issues will clearly be thorny and emotional, but must be addressed. Echelons of command should exist only if they are adaptive within contemporary realities. It will take time to sort out which features of which echelons are adaptive in the context of this information revolution, but form must follow function.

4) **Outstanding Ergonomic Issues:** Very nice, but how do we build it so that people will use it? If the IVIS screens are inside the turret, how do we expect our commanders to exercise open-hatch command? Do we expect them to rap-

idly pop up and down like jack-in-the-boxes? Do we tell them to keep their hatches closed from now on? Do we put an IVIS repeater outside the hatch? Do we put IVIS on a flexible arm so that it can be pulled out when the commander is unbuttoned, and pushed back down when he is buttoned up?

As fussy and fiddly as these details are, they are crucial if we actually expect people to use the system. We must make it easy and intuitive to use.

5) **Run-up Time:** It will take time to doctrinally incorporate the new capabilities in the IVIS system. More than that, it will take time for troops in the field to build up confidence in the IVIS system and to implicitly trust it and thereby take advantage of the enhanced capabilities it offers. This confidence can only be created by experience, by getting the system into the field and into the hands of the troops so they can start learning how to use it.

6) **It Won't Always Work:** There will always be some damn vehicle whose IVIS is down, and which disappears from the map. Periodically entire units may fall out of the system for one reason or another. How will the troops deal with these events? What are the back-ups? The issue is similar to the notion that we don't want troops so dependent upon GPS that they forget how to do traditional land navigation. We don't want IVIS to become an Achilles heel.

7) **Coalition Warfare:** How do we cooperate with non-IVIS-equipped forces? Can our IVIS sets, in English, communicate with the Arabic IVIS sets in Saudi and Kuwaiti M1A2s? What about the next time we fight alongside the Syrians? How will some poor liaison guy get all of those friendly T-62 locations entered in his LCU? Will we become so tied to IVIS operations that we will hesitate to engage in coalition warfare because of the difficulty in cooperating with non-IVIS-equipped forces?

8) **Countermeasures:** Gadzooks, what a can of worms. Communication is the heart of IVIS, and it is vulnerable to countermeasures. Furthermore, communications to certain pivotal systems are crucial, such as GPS, which provides the bedrock positional reality checks for POSNAV. Within the next few years, the U.S. GPS system will be used by a bewildering array of civilian organizations as well as foreign militaries. Will this compromise the system in some way, or expose it to easier countermeasuring? It might.

The IVIS data network is an absolute gold mine of data on friendly forces. How do we keep it secure? What happens when COL Badguyski captures one of our tanks? How compartmentalized should the data network be in case it is compromised (this fits in with point 2 above)? (Presumably there are better minds than mine at work on this, but it needs to be said.)

Once word gets out that an IVIS-linked U.S. force is as good as it ought to be, people are going to start thinking about taking out the weak links. This could be done by anti-satellite technology, knocking down navigational satellites, or with electro-magnetic pulse which might fry not only the satellites, but the IVIS hardware as well. How do we deal with that likelihood?

At first glance, this concern may seem misplaced in the post-Cold War era. However, the more time that goes by, the more such ASAT and EMP capabilities will be available to non-superpowers. Consider on the one hand the tre-

1-4 CAV troops herd 2,000 Iraqis attempting retreat to Basra.

mendous former-Soviet defense establishment which seems increasingly willing to stay in business by working for whoever has liquid capital, and on the other hand the potential of sophisticated nations such as Japan becoming regional rivals in the next decade or so. What to do?

Remain one step ahead. To my mind, IVIS is that one step.

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Notes

[1] COL Rick Swain, *Lucky War: Third Army in DESERT STORM*. Unedited draft dated 22 September 1993, pp. 295-6, and Headquarters 1-4 Cavalry, "The History of the Fourth United States Cavalry," p. E-15.

[2] Headquarters 1-4 Cavalry, p. E-9.

[3] *Ibid.*, p. E-15.

[4] Sean D. Naylor, "Home of the Brave," *Army Times*, January 27, 1992, p. 16, and BG Robert H. Scales, Jr., et al., *Certain Victory: The U.S. Army in the Gulf War*, pp. 302-3.

[5] Steve Vogel, "Metal Rain," *Army Times*, September 16, 1991, p. 22, and Scales, et al., p. 299.

[6] Scales, et al., p. 298. But for an exception to this rule, see the experience of C and D Companies, 4-70 Armor, in "Award-Winning Staff of *U.S. News and World Report*," *Triumph Without Victory*, pp. 378-379.

[7] Vogel, "Metal Rain," p. 22.

[8] These points are taken from Appendices 2 and 3 to the 1st Edition of the 2d Brigade/3d Armored Division History, "OPERATION DESERT SHIELD [sic]: December 1990 thru 27 February 1991."

[9] Steve Vogel, "A Swift Kick," *Army Times*, August 5, 1991, p. 30; Scales, et al., p. 262; and Headquarters, 2d Squadron, 2d ACR, Memorandum for Record, Subject: Historical Narrative of 2d Squadron, 2d Armored Cavalry Regiment's Role in the Campaign to Liberate Kuwait, 23 February-7 April 1991.

[10] David Nilsen, *Phase Line Smash* Historical Notes, pp. 31, 32; LTC Peter S. Kindsvatter, "VII Corps in the Gulf War: Ground Offensive," *Military Review*, February 1992, p. 28; and Swain, pp. 123, 162, 285-6, 300, 304-305, 316 n.67, 331, 350-352, 355-6, 359, 361-2.

[11] (Then) COL Lon E. Maggart, "A Leap of Faith," *ARMOR*, January-February 1992, p. 24.

[12] Staff of *U.S. News*, *Triumph Without Victory*, pp. 362-3, and COL Greg Fontenot,

"Fright Night: Task Force 2/34 Armor," *Military Review*, January 1993, p. 52.

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

[14] *Ibid.*, p. 43-44.

[15] *Ibid.*, p. 51.

[16] Conversation with BG Maggart, Ft. Knox, 7 December 1993.

[17] Fontenot, p. 45.

[18] *Ibid.*, p. 42.

[19] *Ibid.*, p. 45. and conversation with BG Maggart, 7 December 1993.

[20] Conversations with COL Gregory Fontenot.

[21] Fontenot, "Fright Night," pp. 48 and 49.

[22] Steve Vogel, "Hell Night," *Army Times*, October 7, 1991, pp. 16 and 18 uses the figure of the 30 wounded, while the figure of 25 wounded is cited in Sean D. Naylor, "Friendly Fire: The Reckoning," *Army Times*, August 26, 1991, pp. 4 and 6. The latter article is based on the August 13, 1991, DoD announcement on Gulf War fratricide.

[23] Vogel, "Hell Night," pp. 16 and 18; Naylor, "Friendly Fire," pp. 4 and 6; Steve Vogel, "Numbness, Chills Strike Witnesses," *Army Times*, August 26, 1991, pp. 4 and 6; and Scales, et al., *Certain Victory*, p. 285.

[24] Vogel, "Hell Night," pp. 16 and 18.

[25] Scales, et al., p. 285, and Vogel, "Hell Night," pp. 16 and 18.

[26] Vogel, "Hell Night," p. 69.

[27] CPT E. Allen Chandler Jr., Historical Report — Combat Aviation Brigade (3d Armored Division), "4-7th Cavalry Contact with Iraqi Tanks."

[28] Tom Carhart, *Iron Soldiers*, pp. 259-261.

[29] Swain, *Lucky War*, p. 408, plus personal conversations with Swain.

[30] H. Norman Schwarzkopf, *It Doesn't Take a Hero*. Pick a page, any page.

[31] *Ibid.*, p. 463.

[32] Swain, *Lucky War*, pp. 360-1; LTG Ronald H. Griffith, "Mission Accomplished—In Full,"

U.S. Naval Institute *Proceedings*, August 1993, p. 64; and conversation with BG Stanley Cherrie at Ft. Leavenworth, November 15, 1993. Cherrie explained that ARCENT Commander LTG Yeosock had mentioned the possibility of using the 1st (UK) AD to clear the border area to allow a shorter MSR to be opened up for VII Corps in the vicinity of the Wadi al Batin. This impression may have been strengthened by the British division's apparent overreaction to Cherrie's request that they begin looking into that possibility. Although Cherrie intended that they would respond to the request as a U.S. division would, by back-burnering it, apparently the British turned a good deal of (irritated) attention to the issue, as Cherrie found out after the war. Had division commander Rupert Smith passed this on to UK theater commander General Sir Peter de la Billière, it is possible that Schwarzkopf might have gotten an erroneous impression about this notional operation, but that is speculation on my part.

It is interesting that Schwarzkopf calls further attention to this failure of situational awareness on his part by suggesting that Franks use the British division for this putative southern attack. Had Schwarzkopf had a real picture of what the corps looked like that afternoon, it would have been clear that an attack by any corps element other than 1 (UK) AD was out of the question, and he was merely proving his own ignorance.

[33] Transcript appears, among other places, in MAJ Charles D. Melson, Evelyn A. Englander, and CPT David A. Dawson, *U.S. Marines in the Persian Gulf, 1990-1991: Anthology and Annotated Bibliography*, p. 57 and 70.

[34] A very persuasive description of the disconnect between ground truth in the sand and perceived reality at CENTCOM in Riyadh and at the Presidential level in Washington is presented in Rick Atkinson, *Crusade*, pp. 449-454, 469-478. However, after laying this out very carefully, Atkinson unaccountably comes to the preposterous conclusion that even though the entire decision-making process was flawed from the start, that the decision was sound.

The Making of an M1 Tank Driver

by Captain Oakland McCulloch

Photos by SSG Robert A. Roy, TNARNG

In today's unstable world — with unrest in such places as Somalia, Bosnia, Southwest Asia, and the former Soviet Union — the U.S. Army does not know when it will be called upon to fight the next war. However, one thing is certain in today's "force projection" Army — we will have to fight as we are, with little or no time for train-up.

A tank is a crew-oriented system. For the tank to be an effective weapon system, every one of the four crewmembers must know his job and know it well. If one of the four crewmembers fails, then the tank fails. Obviously, the area of greatest concern is the newly arrived driver.

The U.S. Army has historically looked upon the tank as a mid- to high-intensity conflict weapon. In Vietnam, the U.S. Army sent only a minimum of armor units with its 500,000 troops. However, as our recent experience in Somalia has shown, the M1 Abrams and the M2 Bradley are needed anytime U.S. troops are sent anywhere.

With that in mind, 2d Battalion, 13th Armor Regiment (One Station Unit Training for 19Ks) has taken steps to ensure that the newly arrived private sitting in the driver's seat is well trained. The training process can be broken down into five phases: 1) Inprocessing, 2) Static Training, 3) Certification, 4) Verification, and 5) Licensing.

Phase I, inprocessing, includes all the paperwork and administrative work needed to license the trainee. First, every trainee fills out a DA Form 348 during his first week here. He must also attend an accident avoidance class given by a DOD police officer. During this four-hour class, the trainees are given classes on drinking and driving, how long it takes to stop a moving vehicle, and defensive driving techniques. Then, a drivers testing instructor from the Director of Logistics (DOL) gives each trainee the following physical evaluations: reflexes, depth perception and an eye test. If the trainee cannot pass either of these evaluations, he will not receive his learner's permit.

Next, the driver testing section does a background investigation of the driving record of each and every trainee to ensure that he has a valid state driver's license. If a trainee does not have a valid state drivers license, he will not be issued a learner's permit.

Phase II, static training, is conducted by the tank commanders in the motor pool. Each trainee is given classes on the driver's station. He must learn everything about the driver's station and the tasks that he will be expected to perform as a driver of the M1-series tank.

During this phase, the trainees are given a tank demonstration where they can see the M1 and M1A1 tank in action. They are taught the follow-

ing tasks that they will be required to perform as a driver: prepare drivers station for operation, start/stop M1/M1A1 and secure drivers station, trouble shoot M1/M1A1 using the driver's control panel warning and caution lights, extinguish a fire, operate the gas particulate filter unit, unlock stuck parking brakes, perform a fuel transfer, refuel an M1/M1A1, and slave start an M1/M1A1.

The trainees are then taught their responsibilities for Preventive Maintenance Checks and Services. Each trainee is taught the following tasks: maintain the equipment record folder, inspect the hydraulics, perform before- (4 hours of training) and after-operations (1.5 hours of training) PMCS, and service the air induction system and precleaner.

Every trainee must learn these tasks to the standard. Each of these tasks is tested on the Armor Crewman Test I (ACT 1) but, more importantly, they will be tested on the next battlefield. The tank commanders allow no deviation from that standard. Their motivation to train strictly to standard is in part due to the possibility that any trainee could be their driver in the next war.

Phase III, certification, is all simulation oriented. The trainee is introduced to the M1 Driver's Trainer. These trainers, based on the flight simulator model, are an exact replica of the driver's station in an M1-series tank. Therefore, the trainee must do

everything exactly as he would in his real tank in a real situation.

The trainee must negotiate 22 different scenarios to be certified. By the Master Training Schedule (MTS), each trainee is allotted 12 hours in the simulator. (At this time, trainees receive less than that because only 10 of the 18 simulators are on line.)

In the simulator, the trainee must follow a ground guide in the motor pool; drive on a dirt trail, a secondary road, a major highway, and cross-country; drive with the hatch open and closed, during day and night and under NBC conditions; he must drive in fog, ice, mud, rain and snow; he must load/unload the tank from a HET and a rail car, cross an AVLB, and go through a tunnel. The trainee must perform the tasks required by a driver: react to a loss of brakes, detect and react to low transmission pressure, react to a low fuel warning, and transfer fuel.

During the tactical portion of the driver's training, he must drive through and around obstacles while the main gun is firing and artillery is falling around him. He must be able to pick out the best route through the obstacle with minimal direction from the tank commander, just as he must do in a real combat situation.

Before the trainee ever drives a real tank, he has driven approximately 30 miles in the simulator. Just as important, he has learned to operate the tank and he has learned this under conditions that we cannot safely replicate in peacetime.

During Phase IV, verification of the trainee's driver training, the trainees are taken out to the Advanced Driver's Course (ADC) where they get to drive a tank.

In this phase, the trainee drives approximately eight miles. He must cross an AVLB, negotiate a water obstacle, drive around a traffic circle, like those found in small German villages, and drive up and down steep paved roads. They do all of this with

open and closed hatch, in day and night, and under NBC conditions. They actually drive up on a concrete slab the exact dimensions of a rail car. They also go through the steps required to remove the power pack. They must also perform the PMCS of the vehicle before, during, and after operations.

The trainee must continue to negotiate the course until his tank commander is confident that he can drive the M1 tank. If there are problems then the Master Driver or Senior Tank Commander takes the trainee back out on the course to reevaluate him and give him the extra training needed.

The trainee then drives approximately four miles on the cross country (mud) course. He is introduced to tactical driving. He drives while his fellow trainees are doing a TCPC in the turret with their permanent party tank commander. This phase helps prepare the trainees for their move-out gunnery. They must select the best route through the woods to their next fighting position, which is a hull-down position.

The last phase of verification is during gunnery. Some trainees get to drive during a move-out gunnery. They drive approximately one mile while the main gun and coax are being fired; the remainder of the trainees must fire on a stationary range. However, they are still taught berm drills and they experience a live round being fired while they are in the driver's seat. By this time, the trainee has completed his actual hands-on training and he has over 45 miles of combined simulation and actual driving.

The last phase of training is Phase V, 19K10 licensing. Once the trainee has completed all required driver's training, the company commander signs his DA Form 348. The DA Form 348 is then sent to DOL and they produce the trainee's OF 346. The DA Form 348 and OF 346 are then issued to the soldier upon graduation.

When the soldier leaves Fort Knox, he is a licensed M1/M1A1 tank driver, however, this soldier is still a novice. At his next duty station, leaders are required by regulation to test drive the soldier before letting him drive. Their new tank commander must immediately build upon the OSUT training. We have taught the basics but continued on-station training is imperative to develop a true M1 driver ready for combat.

U.S. troops today are expected to be battle-ready at all times. The present world instability increases the likelihood that a number of units could be drawn into battle with newly arrived OSUT graduates. The quality of the M1 driver's training program at 2d Battalion, 13th Armor Regiment ensures that these new soldiers are confident and ready to meet the challenge.

Captain Oakland McCulloch is a Distinguished Military Graduate of Northern Illinois University. He received a Regular Army commission in Infantry in 1986. He has served as a Bradley, ITV, and mortar platoon leader, aide-de-camp and S3 Air with the 24th Infantry Division. He was recently re-branched Armor and is currently Delta Company Commander, 2d Battalion, 13th Armor Regiment, 1st Armor Training Brigade at Fort Knox, Ky.

Back to Basic:

Training Close Combat Skills At the Home of Armor

by Lieutenant Colonel Thomas A. Dempsey

"Sir, Bravo Company is in contact." Following the S3 Air into the TOC, I could feel the tension among the members of the day shift. An hour earlier, we had air assaulted two companies into the valley, following reports of an enemy patrol base in the area. The radios crackled to life with the Bravo Company commander's first SITREP.

"Quebec One-Niner, this is Delta Three-Six. Lead platoon is in contact, size of enemy force unknown.... uh, I've got some casualties up there, I'm going forward with my second platoon to find out what's going on...Over."

The S3 keyed the mike: "Roger, Delta Three-Six. Keep us posted. We've got Blackhawks on standby for

medevac if you need them...Over." While the S3 waited for the answer from Bravo, I turned to the Ops NCO.

"Is the old man still asleep?" I asked.

"Yes, Sir," the tired sergeant responded.

"Better get him up — he'll want to listen to this. And get a contact report up to brigade." The Ops NCO began working up the contact report while his RTO went out to wake up the battalion commander, who had finally found time for some sleep after the air assault was completed.

"Quebec, Delta Three-Six... In contact, heavy casualties in my lead platoon, platoon leader and platoon sergeant are both KIA. We're trying to

get the casualties out now... still don't know how big the enemy is, but I've got heavy contact, heavy contact — requesting medevac for..." The transmission cut off abruptly, the rush of static filling the tent. The S3 tried to re-establish contact:

"Delta Three-Six, Quebec one-niner, you broke up, say again last, over!"

The battalion commander, listening to the end of the exchange as he entered the TOC, strode to the Ops map. "How far away is Charlie Company?" He asked.

"About two Ks down the valley," responded the S3.

"Well, get 'em turned around. Bravo's going to need some help." Turning to me, "XO, go find our Blackhawk guy, and take the FSO with you. Start working a mission to extract Bravo's casualties, and plan for a hot LZ." As I turned to go, the radio traffic picked up again.

"Quebec one-niner, this is Delta Two-Five." Two-Five was the company XO. "Three-Six is down, still in heavy contact. I'm trying to get our trail platoon into the fight. I need medevacs now, over!"

The battalion commander swore. "They're nickel and diming us to death. If we don't get some more combat power in there, we'll lose the whole company," he said, taking the hand mike from the S3. "Delta Two-Five, this is Quebec Three-Six. We're moving your sister element up to support you, and we're cranking the Blackhawks for your medevac, but you have to hold what you got. Don't

Basic trainees from Bravo Company, 2d Battalion, 46th Infantry close with the "enemy" during STX lane training.

commit the rest of your company, we need you to hang on to your LZ. Do you understand, over?"

"This is Two-Five, in contact now, can't break off — I'm hit..." Again, transmission cut off in mid-sentence. It was the last we would hear from Bravo Company until Charlie and Alpha reached the battlefield several hours later, and we began recovering the dead.

Fortunately for us, the "dead" would be "resurrected" as replacements 24 hours later. They had been killed not by real bullets, but by Multiple Integrated Laser Engagement Systems (MILES) wielded by one of the deadliest light infantry forces in the world today — the OPFOR of the Joint Readiness Training Center's 509th Parachute Infantry Regiment. Our infantry battalion was encountering them for the first time during our training rotation at Fort Chaffee, Arkansas.

In the After-Action Review (AAR) which followed the battle, we got some unpleasant surprises. The OPFOR, which we had estimated at a company (minus) was, in reality, less than a platoon. It had succeeded in destroying an entire rifle company in a series of disjointed, squad-on-squad firefights. Losses inflicted by our infantry on the OPFOR were minimal. All in all, it had not been a good day for the BLUEFOR.

While our battalion would learn from that engagement, and would eventually locate and destroy almost the entire OPFOR company, the memory of that first experience remains a sobering one. It became evident during the AAR that the OPFOR won its fire fights for several very simple reasons. They had out-shot us, scoring first round hits with M16 MILES consistently at ranges of one to two hundred meters. They had also used individual movement techniques (IMT) and executed battle drills at the buddy team, fire team, and squad level far more effectively than their BLUEFOR opponents.

Following our rotation to JRTC, I spent a great deal of time thinking about the best ways to train close combat skills in preparation for rotations at a combat training center, and for actual combat. Then, in the summer of 1992, I was designated to assume command of a battalion of five basic combat training companies at Fort Knox, Kentucky. I had never served in an Initial Entry Training (IET) unit, and had no idea of what to expect. I was initially a little disappointed at leaving a line unit, but was determined to make the best of things.

Upon arrival at Fort Knox, and participation in my initial training "cycles," I made several welcome discoveries. My first discovery was the superb quality of the officers and NCOs who made up my cadre. Each company included a captain company commander, first lieutenant executive officer, first sergeant, and 12 drill sergeants organized into four platoons. The officers came from a variety of branches, with armor officers being in the majority. Most of them were veterans of DESERT SHIELD and DESERT STORM. All of the lieutenants were experienced former platoon leaders and company XOs from tank and infantry companies. The drill sergeants, as you would expect of NCOs in Department of the Army-select positions, were among the very best in the Army, most with combat experience and many with multiple rotations at JRTC, NTC, or Hohenfels.

The quality of our initial entry soldiers was also encouraging. Recruiting Command was doing an excellent job sending us motivated, smart young trainees. They were hungry for leadership and eager to meet the challenges of basic training. From the people side, command of a BCT battalion promised to be a rewarding and enjoyable experience.

The most pleasant surprise, however, came as I reviewed our BCT Program of Instruction (POI) and observed my first basic training cycle at Fort Knox. I quickly discovered that BCT focuses on precisely those core combat skills that win firefights at JRTC and in combat. Rifle marksmanship, individual movement techniques (IMT), battle drills and collective tasks at the buddy team, fire team and squad level form the heart of the BCT POI.

The emphasis of the BCT POI on core combat skills directly reflects lessons learned at the combat training centers and in combat zones from Panama to Iraq. Those lessons point to a salient characteristic of the modern battlefield. The risk of close combat today permeates every corner of the combat zone, from the forward line of own troops (FLOT) to the lo-

The XO of C Company, 2-46 Infantry conducts an AAR during the training cycle.

gistics and administrative nodes of the communications zone (COMMZ).

Military occupational specialities that have traditionally been thought of as "non-combat" now expose clerks, petroleum handlers, mechanics, and virtually every other speciality to the hazards of direct combat. That lesson is being reinforced on a daily basis in places like Somalia, Bosnia, and the Arabian Gulf.

Basic Combat Training must, in only eight weeks, establish the core combat skills that will prepare young trainees for the rigors of close combat. At the same time, BCT must transform citizen to soldier, instilling the warrior ethic in the new recruits. It is a challenging mission for all concerned. It tests the skills of the finest noncommissioned officer corps in the world at tasks that sergeants have been performing since ancient Rome's centurions drilled new legionnaires under the hot Mediterranean sun.

In teaching its core warfighting skills, basic training builds logically from simpler to more complex, and from individual to collective. The "crosswalk" of individual to collective task is built into the POI training plans. These plans are designed to take the individual trainee from the most basic individual soldier skills all the way through to small unit (buddy team, fire team, and squad) collective tasks concentrating on "shoot, move, and communicate."

The heart of Basic Combat Training is rifle marksmanship. This is the most important hurdle of the trainees' first four weeks. It begins with two and a half days of instruction on fundamentals, concentrating on the steady hold factors, proper sight alignment and sight picture, and the integrated act of shooting. The Weaponeer and Multi-Purpose Arcade Combat Simulator (MACS) are used extensively to evaluate trainee progress in assimilating the fundamentals of shooting.

Following instruction in marksmanship fundamentals, three days are spent on the rifle range, determining
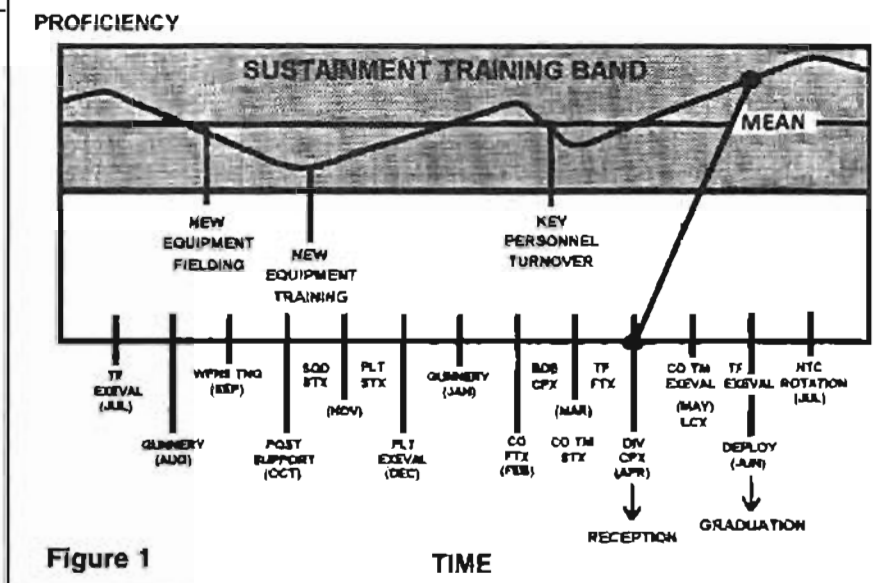

Band of Excellence

Figure 1

the proper zero for the soldiers' weapons and confirming that zero at 75, 175, and 300 meters (compare this to the two or three *hours* spent zeroing in most infantry units — a comment which is made frequently by JRTC observer-controllers). Once the soldier has a properly zeroed weapon, and he has demonstrated his ability to engage targets successfully, three further days and one night are spent on high tech, computerized field fire and combat qualification ranges. During this time, the trainee engages three-dimensional pop-up targets in a realistic combat setting, at all ranges out to 300 meters. His shooting skills are honed with personal attention from drill sergeants, concentrating on systematic, disciplined application of rifle marksmanship fundamentals.

The results can be seen clearly on qualification day, when our BCT platoons routinely qualify 100 percent of their trainees on a demanding, computer-scored qualification range after only four weeks in the Army.

Once the trainees have mastered the individual skills involved in rifle marksmanship, instruction shifts to the more advanced skills necessary to survive and win in the close fight. It focuses on teaching the young soldier how to shoot, move, and communicate under fire. Instruction begins at the individual level, then moves to the

buddy team. MILES-equipped soldiers practice fire and movement against a live, MILES-equipped OPFOR.

They must apply their rifle marksmanship skills while simultaneously making use of available cover and concealment to close with and kill the enemy. The trainee quickly learns that he must depend upon his buddy for survival, and that cooperation and teamwork are the only way to overcome the inherent advantages of the defending OPFOR. The first time the young soldier and his buddy succeed in "killing" the OPFOR — or the first time he suddenly hears his own MILES kill indicator shrilling in his ears — the impact is tangible and immediate.

As the platoons approach their final weeks of training, preparations begin for the capstone exercise that will test for each soldier the combat skills learned in BCT. In the course of a three-day field training exercise (FTX), trainees participate in a series of MILES-supported, externally evaluated STX lanes, with drill sergeants acting as evaluators. The soldiers experience realistic combat situations, requiring them to apply all of the training they have received in the preceding weeks. The lanes are patterned after the combat training centers in that they emphasize maximum realism, thorough and candid evaluation

of soldier performance, and detailed after-action reviews following each lane.

As the soldiers progress through the lanes, they confront the difficulties and hazards of maneuvering two separate elements against a hostile force. Most soldiers will serve at least once as a team leader, learning basic leadership skills that, even as a junior enlisted soldier, they may very well be called upon to exercise in combat. Watching the trainees move through the various lanes during the day, there is a perceptible and significant improvement in combat skills. By the end of the last FTX lane, the soldiers have reached a level of proficiency which, hopefully, will sustain them through that first taste of combat, when most casualties occur.

Within the context of the overall BCT POI and mission training plans, the training environment at Fort Knox offers unique opportunities to NCO and officer leaders. BCT company commanders and XOs, in particular, benefit from the Home of Armor's warfighting focus and commitment to excellence. The post offers superb training facilities, including state-of-the-art computerized rifle ranges, and close combat courses with realistic pop-up target arrays. The live fire close combat ranges permit buddy teams to execute fire and movement, applying all of their marksmanship and IMT skills in a realistic combat setting. For the FTX, maneuver training areas are readily available for all BCT companies, along with a plentiful supply of small arms MILES to support the more advanced squad STX lane training.

There are virtually no training distractors at Fort Knox for the BCT company commander and XO to deal with. The single overriding priority for BCT companies is to graduate a quality soldier, and all of the resources affecting BCT are focused in that direction. There is a genuine and unbending commitment by the Post senior leadership to execute planned training with minimal changes imposed from above. This allows company commanders and XOs to con-

duct detailed planning two to three months out, and then to execute planned training with few changes or disruptions.

"Training is the cornerstone of readiness," as General Vuono noted in his forward to FM 25-101, *Battle Focused Training*. That philosophy is embodied in Basic Combat Training, where the principles articulated in FM 25-101 are applied on a daily basis. To place the mission of the BCT company commander in perspective, review for a moment the "Band of Excellence" that forms the foundation of the FM 25-101 training philosophy (Figure 1). Commanders and XOs in a basic training company, in a period of only eight weeks, bring 200 new and completely untrained soldiers from zero proficiency all the way to the upper slope of the "sustainment training band" in individual combat skills and small unit collective tasks. The lieutenant or captain who masters the task of transforming citizen to soldier in a BCT company is well prepared for the challenge of training for today's battlefield, whether the battle is fought at JRTC or in the streets of Mogadishu.

An additional benefit for armor and cavalry soldiers assigned to BCT at Fort Knox is the mounted warfare training offered at that post. Under the stewardship of Generals Funk and Jordan, Fort Knox has emerged as the premier mounted combat simulation center in the United States Army. Home of the "Virtual Brigade" concept, the Armor School boasts a complete battalion-size set of Bradley and Abrams SIMNET vehicles in its Combined Arms Tactical Training Center (CATTC). SIMNET supports platoon-through battalion-level combined arms operations against up to a regimental-sized OPFOR, across a variety of terrain including the maneuver corridors at the NTC. Training opportunities on post also include Bradley and Abrams Unit Conduct of Fire Trainers (UCOFT) and the newly opened M1 Tank Driver Trainer. The M1A2 tank, at the forefront of battlefield "digitization" with its high-tech on-board computer and Inter-Vehicular Information System (IVIS), rounds out a unique set of training resources that are read-

ily available to armor and cavalry soldiers serving in BCT units. Colonel Hank Hodge, commander of the 1st Armor Training Brigade, places a high priority on getting his BCT cadre "back in the turret" to sustain their key warfighting skills.

The facilities, people, and leadership climate at Fort Knox combine to create in its BCT battalions one of the finest training environments the Army has to offer. It is an environment that is tailor-made for armor branch captains and senior lieutenants, honing their skills in preparation for returning to MTOE units. It is also an intensely satisfying environment in personal and professional terms. Two hundred confident young graduates, standing tall at the successful completion of their initial training, provide tangible examples of the personal and professional rewards that accompany the BCT mission. The pride and gratitude displayed by the young soldiers and their families are poignant reminders of what leadership in the United States Army is all about.

Lieutenant Colonel Tom Dempsey was commissioned in the infantry in 1975. He has served as a rifle platoon leader and company XO with the 25th Infantry Division in Hawaii, and commanded a psychological operations company at Fort Bragg, N.C. During Operations DESERT SHIELD and DESERT STORM, he served as S3 of 1st Battalion, 327th Infantry, 101st Airborne Division (Air Assault), and later as battalion executive officer. He is currently commanding 2d Battalion, 46th Infantry (Basic Combat Training) at Fort Knox. He is a graduate of the Command and General Staff College and the School for Advanced Military Studies.

What Can We Do With Light Armor?

By Second Lieutenant Kevin Rieders
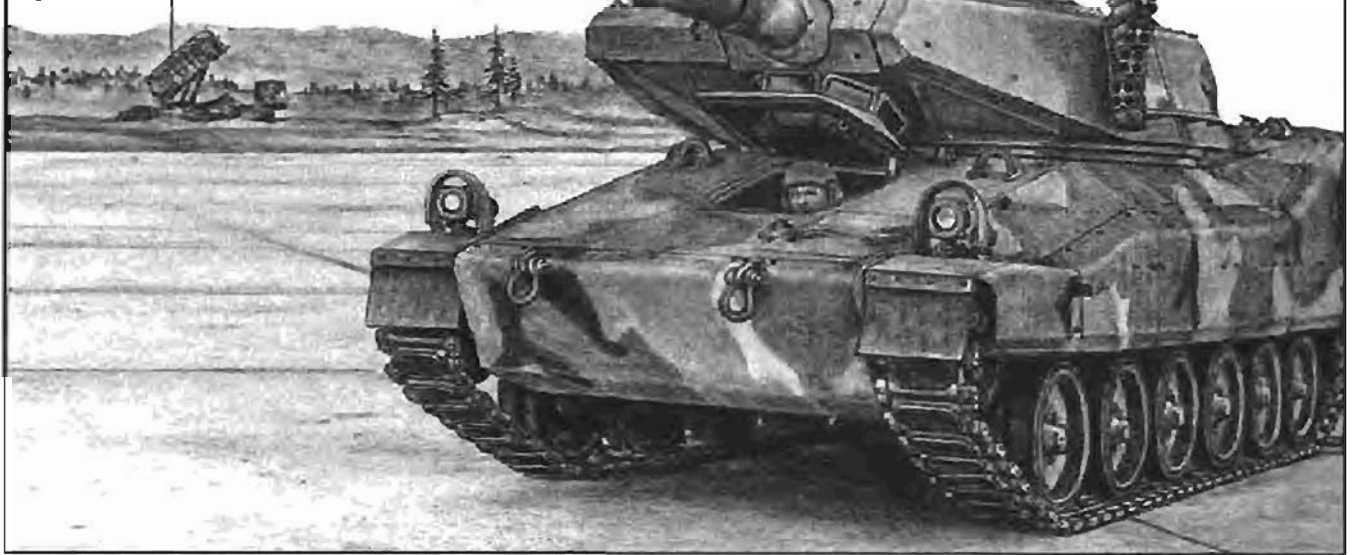
In just less than four years, a new generation of light armor forces will become part of our armor community. While light armor's fielding is years away, the doctrine that will guide and direct our employment of light armored forces is being written now. These light forces — three light armor battalions and a light cavalry regiment — will form the most visible and deployable element with which armored warriors are likely to serve.

This course of events presents us with a singular opportunity to shape the doctrine under which we will train and fight for years to come. Not since the birth of the American armored force have we had the real opportunity to consider at such length how new technologies will be employed on the battlefield. What we do now, or fail to do, will have a lasting impact on what remains to be done when light armored forces deploy for war and operations other than war, once these new systems are fielded.

Light armored vehicles have a long and mixed (some would say mongrel) pedigree in the American armored force. Historically, light armored vehi-

cles have served as infantry support vehicles, as surrogates for tanks, as fighting reconnaissance vehicles, and as airborne infantry's force multipliers. More often than not, a single generation of light armored vehicle has simultaneously been tasked with several of these functions.

From this mixed heritage, it remains for us to develop a comprehensive and consistent doctrine for our new light armor units. Historically, concepts ranged from the bold, sweeping maneuvers envisioned at the dawn of the armored force to the plodding sweep and clear infantry support missions of more recent history.

The varieties of possible tactical employment are further complicated by capabilities such as the use of air assault, and employment in conjunction with attack helicopters. Our doctrinal challenge is to consolidate modern, historical, and conceivable future light armor roles into a cohesive, rational and structured whole. In the current efforts to address this challenge, the most highly developed is FM 17-18, *Light Armor Operations*, which reached final draft in May 1993 and is

now under review. Additionally, FMs 17-95-40 and 17-97-40 are being developed to address squadron and regimental light cavalry operations.

Light armor employment will also rely to some degree on the employment experiences of soldiers of the 82d Airborne, where light armor is task-organized down to, and sometimes below, platoon level. Experience gained in light-heavy operations, deployments, and JRTC/NTC rotations combining armor forces (whether light or heavy) with light infantry will determine how light armor forces should, and should not, be used.

Many lessons concerning light armor's use may be gleaned from the history of American light armor forces. Mechanized cavalry's use of M2 and M3 combat cars in the 1930s, followed initially by Stuart M3- and M5-series tanks, and then M24 light tanks in the cavalry groups of WWII, provide a heritage of light armor forces intent on fighting for information. Light armor's infantry support role dates to use of the Renault FT17 in WWI, and was continued by M10 and M18 tank destroyers in WWII,

M24 light tanks and M41 "76-mm gun combat" tanks in Korea.[1] Light armor has also been pressed into service as a surrogate for more heavily armored (and generally better gunned) medium, or main battle, tanks. The use of M10 and M18 tank destroyers as surrogate tanks forms another branch of American light armor's family tree, while light armor forces in the airborne role began with the M22's development in WWII and continues in the now venerable M551.

Since the close of WWII, the tank's principal role has been to fight and destroy other tanks. Before this, tanks were envisioned as shock weapons to attack soft targets while tank destroyers fixed and killed enemy tanks. The reality proved to be that tanks served as the best antitank weapon while tank destroyers and other light systems were more survivable and effective in reconnaissance and infantry support roles. For instance, as the M24 was fielded to replace older light tanks at "the end of 1944 most (light) tank battalions had learned to use their older M5A1s circumspectly to minimize the danger presented by their thin armor."[2] Like the tank destroyers the M24 was based on, light armor units learned that they could not employ their vehicles as tanks and survive. Light tanks performed the entire range of armored missions, from antitank — to infantry support — to reconnaissance, during WWII. The last officially designated "light tank" (the M24) also served in Korea through 1953.[3] Through this combat experience, the crews of American light armor forces learned to compensate for the limitations of their equipment. A U.S. armored division training circular of the period, addressing use of the armored battalion's light company, advised that "the light tank company provides a fast, mobile element that may be used to exploit the success of the medium tank (companies), to execute battle reconnaissance, or to act as a covering force for the (tank) battalion."[4]

Generally speaking, the gradual abandonment of light armor by the U.S. Army resulted from its employ-

ment as a tank, rather than as a 'tank-like' weapons system fundamentally different than tanks. The failure of light armor systems to perform successfully as tanks resulted in their removal from the inventory, except for those light armor forces that were retained solely due to the strategic mobility inherent in their air-deployability. We must confront these biases and difficulties in developing our light armored doctrine for the next century. We must closely define what armor functions light armor should *not* be

perform identical tasks. The clearing of mines offers an analogy: a mine detector or mine plow's availability makes all the difference in how one goes about removing the obstacle, as opposed to using probes or bayonets alone. In the past, we have expected light armored vehicles to be 'jacks-of-all-trades' without acknowledging that light armor must do things differently.

The present resurgence of light armor forces grows from strategic deployment considerations, NOT be-

"The reality proved to be that tanks served as the best antitank weapon while tank destroyers and other light systems were more survivable and effective in reconnaissance and infantry support roles."

expected to perform, as well as those additional tasks light armor must perform which lie beyond the scope of heavier armor forces.

The development of an American light armored doctrine has suffered from a lack of focus and an unwillingness to differentiate between light and heavy mechanized forces. It is also necessary to define "how" light armor will perform its assigned duties, recognizing that different tools require different methods of employment to

cause of a reevaluation of light armor's utility, proper role, or anticipated function. Like its predecessors, our forthcoming light armor system is characterized by a reduced level of protection and primary armament as compared with the current tank. In the past, strategic deployability has sustained only a fraction of the total light armored force. If light armor forces of the future are worth having, they are worth keeping, and their capabilities and limitations must therefore be addressed doctrinally — outlining spe-

cific tactics, techniques, and procedures peculiar to light armor — to ensure that light armor forces are not poorly employed and abandoned, again.

"Doctrine should reflect new technology and its potential for the future, as well as its effects on Army operations...[5] doctrine must be the engine that drives the exploitation of technology."[6] Doctrine also serves to codify operational realities. In this way, lessons learned through practice and practical experience may become common knowledge. An unfortunate part of this process is the potential for doctrine to ossify as specific solutions are accepted as first general, and then immutable, truths.

How then, should the evolving doctrine for light armor forces reflect the potential of this new technology? Our present doctrine certainly reflects our technology, especially the sense that "Armored units equipped with the Abrams, (can) go where no other forces could survive."[7] Current armored force doctrine, as detailed in Field Manuals 100-5, 100-15, 71-100, 71-3, 71-2, 71-1, and 17-15, has evolved into an aggressive and capable whole, largely due to reflections of the potentials inherent in the M1-series tanks. Exhortations that "To win, one must attack,"[8] to always return fire, and to develop the situation "through fire and movement to fix or destroy the enemy"[9] serve tank leaders well. What is not clear is how well the identical doctrine will serve leaders of lighter armored forces. "It won't be easy for a thin-skinned combat vehicle, mounting however good a gun, to move about future battlefields against conventional heavy armor," wrote General James Gavin in 1947, "It may be that (this) type of tank... has greater tactical defensive qualities than offensive..."[10] Lightly armored antitank guns serving in this manner killed a disproportionate number of tanks during WWII using both stationary and moving ambushes. This was especially true of German employment in North Africa from 1941 to 1943.[11]

Like previous American light armor systems, the varied missions our new vehicle will perform impact on the development of its doctrine. Light armor will be fielded to help airborne forces "force a lodgement,"[12] or in separate armor battalions which may support light infantry divisions or corps, and in a corps-level cavalry regiment. Whatever doctrine is written to guide the light armor leader, that doctrine must contemplate the demands of these varied organizations and their disparate roles and missions. Flexibility of employment and engagement must be emphasized to maintain survivability throughout the spectrum of light armor employment.

In contemplating light armor doctrine, there is merit in 'daring to be different.' Recognizing that light armor systems are neither IFVs, AFVs, or tanks, it should be apparent that their methods of employment may not (and sometimes, must not) mirror those of other fighting vehicle classes and types. Speed and mobility are the hallmarks of mechanized war. In the words of General George S. Patton Jr., "In small operations, as in large, speed is the essential element of success."[13] Although different in scope, range, and circumstance, speed and mobility also characterize light forces. "Light infantry units also exploit speed in their operations... the capability to negotiate difficult ground. By moving to an objective faster than the enemy thinks possible, light infantry can achieve surprise."[14]

It is more than possible that a proper doctrine for light armor will emphasize stealth, speed, maneuver, and independent action, coordinated with other arms to ensure synchronicity and mass in employment. "The application of such heavy firepower... combined with rapid maneuver to the flanks and rear of the enemy's positions, creates a violent shock effect that can lead to quick victory."[15] Coordination with other arms to create shock action will be even more vital for light armor forces than for their heavier brethren. "Light mechanized or armored forces will not be able to tackle heavy units head-on in direct

fire engagements; instead, they must rely on stealth, concealment, maneuverability, and high technology weaponry to achieve their goals."[16] In this manner as "light infantry forces maintain a flexible attitude toward the battlefield,"[17] so, too, will their light armor compatriots.

Light armor doctrine delineated in existing publications is still coalescing. For instance, FM 100-5's perspective is that:

Light armored units can participate in a variety of Army operations, including rapid worldwide deployment, throughout a wide range of environments. Tactical missions include providing security, reconnaissance, and antiarmor firepower to the light infantry or airborne division. Light armored units also conduct standard armor operations, including the destruction of enemy forces in coordination with other arms.[18]

The final draft of FM 17-18 puts forth the much more limited view that "the primary purpose of M8 light tank forces is to operate with light infantry during rapid-deployment contingency operations."[19] (M8 is the designation for the new Armored Gun System.)

At divisional level, our doctrine does not address light armor at all, holding that "heavy forces are categorized by their capability for ground mobility, not armor protection"[20] and groups motorized formations with heavy forces. At lower tactical levels, however, it is imperative that we make more subtle distinctions about a force's 'weight.'

A step in this direction may be FMs 17-95-40 and 17-97-40, which are currently being written to address the new formations of light cavalry regimental and squadron organizations. Attempting to cope with the difficulties inherent in adapting mission profiles designed for heavy forces and the fields of Europe to lighter forces and worldwide contingency operations, the authors of these manuals must resolve a vast range of questions. These issues embrace not only

the use of emerging technology, but new uses of existing systems, as in the increasingly widespread use of HMMWV scout platoons. In a very real sense, these are not new problems. Almost 50 years ago, *ARMOR* Magazine (then, the *Cavalry Journal*) printed articles advising that "written doctrine needs modification... based upon the past and present employment of mechanized cavalry,"[21] and the author also cautioned that "Cavalry's heritage — mobility of mind and body — must not be compromised."[22]

Doctrinal manuals specifically designed for light armor battalions, companies and platoons are not currently envisioned since sections of FM 17-18 address these organizations. Light cavalry regimental, squadron and troop manuals are, in contrast, already under development. One question that might be addressed in this regard is whether formations down to platoon level in light cavalry and light armor organizations need their own sets of field manuals. Such a move could involve the development of related Mission Training Plans (MTPs) and Army Training and Evaluation Programs (ARTEPs) now contemplated. The advisability of this course of action is, of course, dependent on determining that light armor forces possess unique characteristics requiring singular doctrinal approaches. The fact that such a doctrine is being composed in the light cavalry squadron and regimental manuals, and the possible need for ARTEP, MTP, and MOS-based publications, might indicate that FMs for all command levels and light armor formations are needed.

The tactics, techniques, procedures and equipment of our light armor forces are still being molded. As the future employers of light armor forces, it is the armor community (us) who can best help shape this new force. Instead of snarling disagreement with a defenseless manual's faceless authors during some future ARTEP or training rotation, perhaps light armor soldiers will be able to take pride in an individual idea accepted as doctrine!

ARMOR Magazine is well suited to serve as the sounding board and wellspring of ideas for the coming light armored force. The individuals responsible for writing light armor's doctrinal manuals are interested in hearing from the larger armor community. Articles and letters written to *ARMOR* will reach these authors whether published in the magazine or not. NCOs, officers, and enlisted ranks with strong feelings about what light armor should be, or experiences with light armor operations, should detail their thoughts in this forum. At this time, the writers of these manuals are most interested in tactics, techniques, and procedures adopted or abandoned by armor soldiers in light forces. Combat Training Center (CTC) experiences would be especially prized by many of these authors.

Light armor forces have been eclipsed and abandoned in the past. Those who will ride the vehicles should help write manuals — sow the wind before we reap the whirlwind, so to speak. With the strong input of the armor community, our light armor forces of the future will be vibrant, focused, and effective.

As in the past, the way things are "really done" will be developed by the people engrossed in the doing of them. The point here is that, with the input of those doers, we can reduce the gap between the "book" or "schoolhouse" solution and the realities of the field before one or the other crashes and burns. We have the knowledge, we have the technology, we can be better, faster, stronger than ever before...and the hardware isn't even six million dollars a pop.

Notes

[1]Zaloga, Steven J., *U.S. Light Tanks: 1944-84*, 1984, Osprey Publishing Company, London, p. 10.

[2]*Ibid.*, p. 5

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

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

[5]FM 100-5, *Operations*, June 1993, p. 1-2.

[6]*Ibid.*, p. 2-3.

[7]Kelly, Orr, *King of the Killing Zone*, 1989, W.W. Norton & Co., N.Y., p. 234.

[8]FM 17-15, *Tank Platoon*, October 1987, p. 3-1.

[9]*Ibid.*, p. 3-12.

[10]Gavin, MG James M., "The Future of Armor," *Armored Cavalry Journal*, November-December 1947.

[11]Harris, J.P. and Toase, F.H., ed., *Armoured Warfare*, 1990, B.T. Batsford Ltd., London, p. 78.

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

[13]Patton, GEN George S. Jr., quoted in *Marine Corps Gazette*, August 1993, p. 62.

[14]McMichael, MAJ Scott R., *A Historical Perspective on Light Infantry*, 1987, U.S. Army Command and Staff College: Combat Studies Institute, p. 225.

[15]*Ibid.*

[16]Mazarr, Michael J., *Light Forces and the Future of U.S. Military Strategy*, 1990, Brassey's (U.S.), Inc., p. 59.

[17]McMichael, p. 220.

[18]FM 100-5, p. 2-23.

[19]FM 17-18, *Light Armor Operations* (Final Draft), May 1993, p. 1-2.

[20]FM 71-100, *Division Operations*, 1990, p. A-1.

[21]Hoy, LTC of Cavalry Charles J., "Trends in Mechanized Cavalry," *The Cavalry Journal*, July-August 1945, Director of Training, the Cavalry School, former commander 81st Mechanized Cavalry Squadron, 1st Armored Division.

[22]Hoy, p. 58.

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Is Well-Rounded Actually Better?

by Captain George Salerno

In this changing world, where things become ever more complex, the need for specialization increases. This is evident in the professional world. In the field of medicine, for example, doctors can no longer just be general practitioners. They must specialize in neurology, orthopedics, radiology, podiatry, etc. Often, they enter sub-specialties, such as gastrointerology or child psychology. Lawyers also specialize in constitutional, international, contracting, or criminal law. Investors specialize, engineers specialize, salesmen specialize. Success in almost all professions is geared to a narrow field. The dictionary defines a profession as "an occupation or vocation requiring training in the liberal arts or sciences and advanced study in a specialized field."

If the Army considers itself a profession of arms, then why does it feel necessary to make officers and leaders generalize, changing tracks in the name of development? Do we need a "well-rounded" officer or an officer who is an expert at his job?

The Army needs to once again focus the branches into specialties or tracks, as it once did. Armor and cavalry are both under one branch yet they are still worlds apart. Armor deals with fire and maneuver to destroy the enemy, while cavalry maneuvers to gather intelligence and avoids decisive engagement. The arguments are also valid for infantry (light/mech/airborne), field artillery (tube/rocket/light/mech), air defense (MANPADS, SHORAD, HIMAD), aviation (attack/lift/assault), and so on. All branches can be broken down into some smaller sub-branch because information for each specialty (branch) has increased so much over time. The only way for people to keep up with changes in their fields is to stay focused. To do that, we need to sub-specialize within branches.

The reason professions must focus on certain areas is simple. With the improvement of technology, information for each specialty has increased, and it is really impossible for one person to fully understand and master the different techniques and thought processes required for each branch. We must concentrate on one area and become masters of it in order to make the whole system work.

A good parallel to combined arms operations is in the realm of medicine. The "battlefield" is the operating room. The combat arms officers are the surgeons. They will do the actual "battle." There is no way he/she can win the battle without support. The combat support personnel are the anesthesiologists and nurses. They are on the "battlefield" providing the support to the "combat arms officers." Finally, there are the orderlies, medical suppliers, and others not on the "battlefield" who provide the "combat" service support. All are needed to win the battle. Yet, you will not find a nurse doing the anesthesiologist's job, nor the podiatrist or orthopedist doing the neurosurgeon or heart surgeon's job. They cannot, because too much knowledge is needed to handle the one job well. This is especially true when someone's life is on the line. And life and death is as much a part of the military profession as it is in the medical profession.

Equipment is an area where specialization will benefit. Each branch and sub-branch uses different equipment to accomplish its respective mission. This is very evident in armor. Tankers will use M1A1s to accomplish their mission. Cavalry will use M3A2s and M1A1s to accomplish theirs. In the current system, an officer who was previously cavalry may go into an armor battalion and vice versa. The officer must learn a whole new vehicle, both in terms of operations and maintenance. He starts behind everyone else in his unit. If one were to stay either armor or cavalry, the knowledge and experience gained and used over a career can be carried over. The leader no longer starts from behind. This is already done, to a limited degree, in Army aviation. Aviators will be geared toward a specific aircraft, which in turn gears them for a specialized mission (i.e. assault). If we want well trained officers who know their equipment, then branch tracking is geared towards that end.

Tactics is another area where branches can benefit by narrowing their focus. Armor operations and most cavalry operations are like night and day. The main purpose of armor operations is to close with and destroy enemy forces by mass, firepower, and shock effect. The main purpose of cavalry is to conduct reconnaissance and security operations. The same comparison can be made in infantry operations. Light infantry tactics are different from those of mechanized infantry. Though they both fight in generally the same way (close with the enemy by fire and maneuver), the methods and scopes are different. The requirement for specialization is evident in the fact that the Army publishes separate doctrinal manuals for armor and cavalry, light and mech infantry, and so on. There is no way one can absorb all that knowledge and all that experience in a three-year tour. If an offi-

cer goes from a cavalry unit to an armor unit, much of the knowledge cannot be carried over and is thus wasted. The same is true for an armor officer who moves to a cavalry unit. The knowledge and experience gained by an armor officer cannot be carried over to cavalry. The same argument can be applied to any branch. We expect that lawyers will stay with one type of law. For a business lawyer to practice criminal law would be considered outrageous. He would be taking someone's life into his hands. In our profession the price is the same — people's lives. We cannot afford to waste precious knowledge when we are dealing with lives.

With this knowledge comes experience that is irreplaceable. As the Army grows smaller, and money for training gets tighter, experience carried from one assignment to the next will be a key element in maintaining readiness. If the knowledge and experience can be carried over to future assignments, then it can only make the unit stronger. One of my peers, an artillery officer, is one of the few officers who has experience with MLRS and ATACMS during DESERT STORM. He is being urged by his superiors that he now needs to be in tube artillery, thus wasting all his valuable knowledge and experience with the MLRS and the ATACMS. Would a cavalry squadron commander rather have someone who has cavalry experience fill the boots of a commander in the middle of battle or someone with only armor experience? Probably the one with the cavalry experience. The reason would be logical. Just by virtue of his past, and all other things considered equal, he would have the edge. He would have the knowledge and experience to carry out what he has practiced.

There are many arguments heard against specialization within branches. One argument is that it will impede the development of officers as they move to higher level operations. A primary purpose of a commander is to train his subordinates to take command in the future. A light infantry commander will teach and prepare his lieutenants for company command. Most of his experience and guidance will be from his command in light infantry. When the lieutenant moves on and takes command of a mech infantry company, he loses some of the relevance of what he has learned because of the new environment. One can say, "But we are trained to be commanders." This is true to a certain degree, but to be the best commander possible, a critical aspect is experience, and this is missing if the Army switches officers within branches.

Another argument is that, when one does not specialize, he is more knowledgeable of the "big picture" and is thus able to be, as a peer stated, "a conductor of an orchestra." When a commander reaches a level of command where he is a "conductor," he is among a very small percentage of Army officers. He has worked with all branches by that time and integrated

them at one level or another. CGSC and senior level officer courses teach and train officers to integrate all types of forces at a point where they fight on levels of brigade or higher. Moving officers from armor to cavalry, or light to mech infantry, is not warranted for the few officers who reach a level where they will need to be "conductors," and who will learn this art from schools, as well as experience.

Another argument is that officers learn to transition from one specialty to another — that schools give the officer a basic overview of his new job, but a majority of his training is "on the job." Advance courses do not teach tactics. They teach operations and staff execution for the most part. The school response was that the previous commanders, not the school, teach tactics. Again, the critical aspect of experience is missing.

What happens to career opportunities if branches do specialize? Instead of "promotion pyramids" getting smaller, there will just be more of them. And instead of having more infantry officers, or armor officers, there will be fewer light infantry officers, mech infantry officers, armor officers, and cavalry officers. To this point, the question of inbreeding and the effectiveness of leaders arises. This is already present in some areas, such as the armored cavalry regiments and the Ranger battalions. To my knowledge, there is no decrease in the efficiency of these units. In fact, I would venture to say that these units are more efficient and have a higher level of esprit than most units due to all the experience and camaraderie of everyone knowing one another.

The debate on whether to make officers more "well-rounded" or more specialized will go on for some time, but these facts and others should be looked at and considered. The Army already manages enlisted personnel by specialties and MOS. Rarely does one leave their MOS. The time has come for officers to specialize as most armies do, and as most professions do. The decrease in size of the Army warrants a return to specialization. Specialization will provide officers who are technically and tactically more proficient, as well as an experience base that can be used by officers in the future. They can then pass it on to those who follow in their footsteps. The bottom line is to create an Army that is the best it can be. This is especially true when dealing with lives, both those we defend and those we command.

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Modern AT Mines — A Real and Lethal Threat

by Captain James M. Parker

Mines, typically an inexpensive means of halting, impeding, or diverting an enemy force, have gotten much more sophisticated. Using advanced materials and technologies, mines, especially antitank mines, have become harder to detect and destroy, more versatile, more prolific, and more lethal.

Modern mines incorporate a greater variety of fuzes and sensors, in addition to conventional pressure, tilt rod, and magnetic fuzes. Both the United States and other countries manufacture or are developing mines with acoustic, seismic, and infrared sensors. Microprocessors and small, long-life batteries now make everyday "dumb" mines "smart" by giving them, for example, the ability to count five passing vehicles and detonate as the sixth vehicle passes.

Methods of detecting AT mines predominantly rely on observing surface laid mines, seeing evidence of buried mines, or detection of the magnetic fields emitted by the metallic components of buried mines. The use of nonmetallic parts (especially plastics) in the manufacture of non-U.S. mines has significantly decreased the magnetic signatures of buried AT mines so that they become nearly undetectable with magnetic mine detection gear. Visual detection of plastic mines has also been made more difficult with the addition of colored dyes to the plastics used for the mine covers. The difficulty of detecting these mines is demonstrated by the fact that there are areas of the Falkland Islands which were cordoned off by the British in 1987 because of the difficulty in finding and clearing the Argentine minefields placed before and during the Falklands War.[1]

Once detected, it is not easy to destroy AT mines, if a bypass cannot be found and mechanical or manual breaching equipment and methods are unavailable or impractical. Some pressure-activated AT mines are blast hardened through the use of fuzes which will detonate after two pressure impulses or after the application of a sustained pulse. These fuzes prevent the activation of the mines from the blast of artillery, fuel-air explosives, and line charges such as the Mine Clearing Line Charge (MICLIC). The only sure way to destroy these lines would be to place explosive charges on each mine and detonate the explosives to achieve a sympathetic detonation of the explosives in the mines. Once the mines are destroyed, a cleared lane through them must then be marked with durable, day/night visible markers. This translates into a time-consuming process which will jeopardize lives and possibly the success of the mission.

As AT mines have become more difficult to detect and destroy, they have also become more versatile. The 1950's-era M15 AT mine, while still lethal, is technologically old and cumbersome. Newer mines are smaller, lighter, have the capability to detect along the full width of a vehicle versus the track width-capable M15, and are deployable from a variety of delivery systems. Many countries can currently deploy AT mines from tracked and wheeled vehicles, artillery projectiles, jets, helicopters, missiles, and/or rockets. Finally, making use of better batteries, integrated circuits, and modern manufacturing techniques, many AT mines are now waterproof in both salt and fresh water, and can lie, for weeks on end, under a meter of snow ready to detonate.

Microprocessors have also enabled the development of two new classes of AT mines called off-route and wide area mines. The off-route mine is placed some distance back from a route with a clear line of fire to a passing target. The mine fires as it detects the target passing. A wide area mine uses its sensors to detect a target in its 360-degree detection zone. The target is engaged if it subsequently enters the mine's engagement area. These mines typically attack their targets from the side or top and at ranges of up to 100 meters. Sensors in the mine will detect a target via its noise, magnetism, vibration, or thermal signature and fire either an explosively formed penetrator (EFP) or a sublet with an EFP at the target. One off-route mine in development is roughly the size of the paperback version of Tom Clancy's novel, *The Sum of All Fears*.

Figure 1. Entry hole created by an explosively formed projectile.

Figure 2. Exit hole created by the same explosively formed penetrator. When this photograph was taken, the metal surrounding the hole was still crackling and sizzling from the heat produced by the penetrator.

There are many manufacturers of AT mines worldwide. Some of the largest producers and exporters are private and national industries in Italy, China, and the former Soviet Union. Every region of the world, though, has a country or company that produces sophisticated AT mines. For instance, a company in Singapore has a license to manufacture Italian mines and South America and Europe have numerous companies and countries that make AT mines that are available on the world market. Of note is the former Yugoslavia, which has been a leading manufacturer of advanced AT mines. Yugoslavia also worked with Iraq to produce the joint Yugoslav/Iraqi 262-mm LRSV M-87 multiple launch rocket system which can dispense 30 AT mines per rocket.[2]

The large number and widespread use of both AP and AT mines has created an international problem. The majority of these mines, once deployed, will either remain active or become EOD hazards. Countries such as Afghanistan, Cambodia, and Kuwait are currently or have conducted extensive and time-consuming operations to clear their countries of these mines. To preclude the need for these country-wide mine clearing operations, the United States and several other west-

ern countries currently manufacture both AP and AT mines that will either self-neutralize or self-destruct after an elapsed time. United States mines that fall into this category are all of the mines in the Family of Scatterable Mines (FASCAM) such as VOLCANO, the Modular Pack Mine System (MOPMS), artillery delivered RAAM and ADAM, and USAF/USN airplane-delivered GATOR.

As stated earlier, the lethality of advanced AT mines has increased. The following figures show the effects of various, representative U.S. mines that are either fielded or in development. These figures provide convincing evidence of the lethality of current AT mines.

Figures 1 and 2 show, respectively, the entry and exit holes of an explosively formed penetrator (EFP) shot through a steel plate. EFPs such as this one are commonly found in off-route and wide area mines that are intended to attack an armored vehicle from the top or sides. Figure 3 shows the effects of a scatterable AT mine against three steel witness plates. One can clearly see that this mine will penetrate the belly armor of an armored vehicle with sufficient energy remaining to cause damage inside the hull. A buried, nonmetallic AT mine would have the same effect. The mobility kill from a mine designed to break track is seen in Figure 4. In this figure, the mine was placed beneath the left side track, between the 4th and 5th roadwheels, on an M48 hull. No damage was seen to the hubs or roadwheel arms, but a three-foot length of track was destroyed and the two roadwheels damaged. Had the tank been moving, the track would probably have been laid out also. Re-

Figure 3. Effect of a scatterable AT mine against three, steel witness plates. The mine was fired from left to right.

Figure 4. Damaged road wheels and track caused by a track-width AT mine. This type of mine is activated by the ground pressure exerted by an armored vehicle.

gardless, the minimum effect of the mine is a unit that has been delayed in accomplishing its mission and a damaged tank with several hours of labor intensive work to get it mission capable.

AT mines have always presented a difficult problem for our armored forces. Today's advanced AT mines are an even greater problem that requires widespread awareness and attention. In our next contingency mission, we may not have the time to become aware of the AT mine threat once in country. Furthermore, we may find ourselves confronting an enemy who not only has advanced AT mines, but also knows how to properly employ them. Thus, the threat posed by advanced AT mines is very large and very real.

Notes

[1] Human Rights Watch/Arms Project. Landmines - A Deadly Legacy (Draft). New York, N.Y. 1993.

[2] Foss, Christopher F., and Gander, Terry J. (ed.), Jane's Military Logistics 1990-91, Jane's Information Group, Surrey, UK, 1990.

Captain James M. Parker was commissioned in 1983 from the University of Delaware and holds a BA in history and an MS in materials science. A graduate of AOBC, AOAC, CAS[3], and Materiel Acquisition Manager's Course, he has served as a tank and scout platoon leader, company XO, and S3 plans officer with 2-68 Armor in Baumholder, Germany, and as test officer, U.S. Army Armor and Engineer Board, and company commander, C Company and HHC, 1-81 Armor at Ft. Knox, Ky. He is currently assistant project manager, Office of the Project Manager for Mines, Countermine, and Demolitions, Picatinny Arsenal, N.J. He was selected for Major in November 1993.

LETTERS

get out of the box mentally about the utility, especially in a force projection context, of the M1 Abrams. No one is going to quibble about it being the best tank in the world, but the best tank in the world don't do you a lot of good if you can't get it where you want it quickly, to fight.

I disagree with Major Spurgeon and Mr. Crist that the "devastating effectiveness of precision-guided munitions (PGMs) and ground attack aircraft ..." makes the tank obsolete. We've been beating that drum for a long time and the rationale continues to be overly simplistic and kind of a shopworn, glittering generalization.

Bottom Line — we've got to be affordable — we've got to be able to get there quickly — we've got to be mobile and we've got to be lethal. Oh, and by the way, we've got to be quicker about getting the AGS. We've already burned too much daylight in this seemingly ponderous and difficult-to-understand acquisition and fielding process. I would also strongly recommend that we, as a community, stop sniveling about terminology and the various kinds of gee-whiz crap we want to hang on it. This does nothing more than delay the process and detract from our credibility and commitment.

We've got great doctrine, superb soldiers, elan, panache, and a great tradition for mounted combat! What we don't have is a deployable, reliable and affordable AGS. Let's get on with it!

A.J. "BEAU" BERGERON
Steilacoom, Wash.

SIMNET Prospective

Dear Sir:

In SIMNET, the delay is one of the most difficult missions a scout platoon can conduct.

It is apparent that the reduction of time spent in actual field exercises has dramatically affected our ability to maneuver and conduct the critical missions required in armor and cavalry operations. Even with SIMNET, there is a marked loss of maneuver skills; this, coupled with the inability to practice actions on contact, coordination and use of indirect fires, and movement techniques severely handicaps readiness.

Here, I offer a partial solution that will negate this situation. My platoon, like most of yours, can conduct a zone recon, tactical road march, or ROM with the best. But for some reason, we just couldn't delay. Here's how to fix the problem. The unit (in this case a "J"-series scout platoon with tanks in support) needs to conduct a relatively short zone recon or movement to contact resulting in a hasty screen and FRAGO. The new mission calls for the delay of a

much larger force. Graphics for the mission must have several phase lines so maneuver space is rigidly controlled, and an enemy No Penetration Line (NPL) or Limit of Advance (LOA).

Once the platoon has set on the LOA, time must be given to the platoon leadership to prepare for the delay mission. The time required will depend on leader experience, terrain, and the size of the ground from LOA to NPL. During this time, the platoons must accomplish the following:

1. Plan and coordinate indirect fires/CAS, and establish trigger lines.

2. Determine time lines from possible first sight of enemy to actual contact with the screen. This will require scouts to move forward and time the expected route of march at a doctrinal rate of speed.

3. The platoon must practice movement to subsequent screens/BPs until the drivers can make the move without guidance.

4. Rehearse handing off "leakers" to sister elements on the flank or to the overwatch element.

While platoons are conducting their rehearsals, the OPFOR must be planned. The Semi-Automated Forces or SAF station is critical to the success of the mission. At the SAF, a pre-planned attack must be coordinated that will allow the operator enough flexibility to speed-up or slow formations as they move toward the unit being trained. The ability of the OPFOR to engage is also important and must have an ON/OFF switch. This will ensure that the unit is not killed off so early in the mission that no training value is obtained. Enemy forces must be tailored to the unit's ability and must be easily adjusted.

At rehearsal completion, the platoons must reestablish the screen and conduct an AAR to point out strengths and weaknesses. This will allow the leaders to voice concerns and make recommendations. Alternative courses of action should be discussed and acted upon if found noteworthy. After refinement of the initial plan, final unit

coordination is completed and the battle can begin.

From initial contact to ENDEX the commander must enforce the requirement that leaders follow the steps for actions on contact.

1. Report
2. Develop the situation
3. Determine a course of action at platoon level
4. Recommend a course of action to unit commander

The platoon must also move at the prescribed trigger points to maintain maximum separation, but also maintain contact. Indirect fires must be continually shifted for best effect. Finally, the plan must be followed throughout the entire movement.

During the exercise, schedule breaks in the battle to allow the platoon sergeants to gather class V status, as well as information on casualties and vehicle disposition, and reconsolidation. The length of these breaks is geared to the units' ability to accomplish these particular tasks. Platoon leaders can assess mission progress and make adjustments to the plan. At the NPL, the last of the enemy should make its move, turn aside, or stop. Leaders conduct a quality AAR immediately. Discuss elements that will improve the delay, and repeat the exercise at higher speed if time allows.

The delay in SIMNET will provide the unit with a multitude of opportunities to exercise skills that are lost with time. With our defense budget slashed in an effort to reduce government spending, unit leaders must continue to be aware of every available and innovative resource that will enable us to more effectively train our soldiers. SIMNET has been, and will be, the most efficient means of conducting maneuver training at home station for several years to come.

SFC L.A. HARDY
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Ernest R. Kouma Tank Platoon Gunnery Excellence Competition

The competition window for the Active Component (AC) and Reserve Component (RC) for the Ernest R. Kouma Tank Platoon Gunnery Excellence Competition was announced on 11 March 1994 to the force. The competition for AC and RC roundout and roundup units opened 1 March 1994 and will close 1 March 1995. The competition window for the RC non-roundout and roundup units opened 1 March 1993 and will close on 1 March 1995.

AC tank platoon winners will be determined based on their Tank Table XII scores. RC tank platoon winners will be determined based on their Tank Table VIII scores. Units equipped with M60A3, M1, or M1A1 tanks are eligible to compete in this competition. Timelines for the reporting of the winning platoons are outlined in the message.

Messages were sent down to the battalion/squadron level. If your battalion/squadron did not receive the message, please check with your higher headquarters. Refer to the May-June 1993 issue of *ARMOR* detailing the Kouma competition in greater depth.

For further details on the message or any questions regarding the competition, please feel free to contact the Gunnery Training and Doctrine Branch, 5th Squadron, 16th Cavalry Regiment, U.S. Army Armor School, DSN 464-1736/5765 or commercial (502) 624-1736/5765.

Updating the Account of D-Day

D-Day, June 6, 1944: The Climactic Battle of World War II by Stephen E. Ambrose, Simon & Schuster, New York, 1994. $30.00.

The airborne and amphibious landings in Normandy on June 6, 1944, were, in the words of Winston Churchill, "The most difficult and complicated operation ever to take place." Years of preparation and months of planning ended as Allied forces clawed their way ashore to establish a second front in France. D-Day was indeed a critical time for the Allies, for had the Wehrmacht succeeded in repulsing the invasion, the American and British armies would probably have not been able to try again until 1945. The Germans would then have been able to pull reinforcements from France to use against the Red Army on the Eastern Front. Fully comprehending the importance of Operation OVERLORD to the Allied cause, even Joseph Stalin paid tribute to the Allied invasion by stating, "The history of war does not know of an undertaking comparable to it for breadth of conception, grandeur of scale, and mastery of execution."

In D-Day, June 6, 1944, noted historian Stephen Ambrose has written the definitive history of the decisive day in the battle for Normandy. Ambrose, Director of the Eisenhower Center at the University of New Orleans, has spent decades compiling oral histories and written accounts from thousands of participants in the battle. He has woven these accounts into a highly readable, historically accurate work that traces the invasion from beginning to end, from German preparations and Allied planning and training to the bitterly contested battle itself. The personal stories of the soldiers, sailors, and airmen of the Allied Expeditionary Forces rivet the reader to the pages of the book, but they never overwhelm the larger issues which Ambrose discusses so well.

One of the themes that runs through D-Day is the triumph of the democracies of the West in turning civilians into combat ef-

fective soldiers in a short period of time. Only two of the five American divisions committed on June 6th had previous combat experience in the North African and Mediterranean Theaters of operation (the 1st Infantry Division and one regiment of the 82d Airborne Division had fought there; the 4th and 29th Infantry Divisions, the 101st Airborne Division, and three of the four regiments in the 82d Airborne Division were new to combat). Despite their lack of experience, American, British, and Canadian soldiers fought bravely and well.

Allied officers likewise performed well. Men such as Brigadier General Theodore Roosevelt, Jr., assistant division commander of the 4th Infantry Division, Brigadier General Norman Cota, assistant division commander of the 29th Infantry Division, Colonel Charles Canham, commander of the 116th Infantry Regiment that landed in the first wave on OMAHA Beach, Major John Howard, whose men took Pegasus Bridge by glider assault, and Second Lieutenant John Spaulding, who led his platoon from E Company, 16th Infantry up the bluff behind Easy Red Beach to neutralize the German defenders and help open the E-1 exit off OMAHA Beach, provided the aggressive and flexible leadership necessary to overcome obstacles once the elaborate landing plan failed. By contrast, Ambrose rates German leadership from the top down as "pathetic." Afraid to take the initiative, German defenders allowed Allied forces to crack the vaunted Atlantic Wall in less than a day, and on most beaches in less than an hour.

Ambrose is thorough in describing the experiences of Allied forces on D-Day, although his account of OMAHA Beach is the most extensive and most gripping part of the book. Bomber crews, fighter pilots, landing craft operators, tankers, engineers, artillerymen, Rangers, paratroopers, glidermen, demolition teams, beachmasters, the folks at home, and even film crews and reporters all get their due. Ambrose naturally focuses, though, on the combat soldiers. When the massive air and naval bombardments failed to destroy the German fortifi-

cations guarding the exits from OMAHA Beach, someone had to climb the bluffs to attack the German positions from the rear and open the draws to vehicular traffic. As Ambrose writes, "That someone was spelled i-n-f-a-n-t-r-y."

D-Day will become an instant classic of military history. Written fifty years after the event, Ambrose has been able to draw on much material that was not available to Cornelius Ryan when he wrote The Longest Day. Access to the ULTRA secret and the large number of oral histories collected at the Eisenhower Center has allowed Ambrose to write what will become the definitive history of D-Day. This book is full of combat and leadership examples that officers and noncommissioned officers would do well to study. D-Day was also the largest joint and combined operation in history; its lessons will be valuable to the United States Army of the 21st century.

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The Battle of the Generals: The Untold Story of the Falaise Pocket — The Campaign that Should Have Won World War II by Martin Blumenson, William Morrow, New York, 1993. $24.50

In August of 1944, the Allied armies in France had the ability to destroy two German armies in Normandy and thereby end the war within a matter of months, if not weeks. The opportunity was, according to General Omar N. Bradley, one that "comes to a commander once in a century." In his revisionist account of the Normandy campaign, Martin Blumenson castigates General Bradley, along with General Dwight D. Eisenhower and Field Marshal Bernard L. Montgomery, for throwing away the opportunity to destroy the German forces opposing them and instead focusing their efforts

on gaining ground. As a result, the bulk of the German forces in Normandy escaped the Allied trap, retreated in good order across the Seine River, and were able to patch together another defensive front as the Allied pursuit died out due to logistical problems. "The Miracle of the West," as the Germans called it, should never have happened.

Blumenson analyzes the OVERLORD plan as, in essence, a logistical document. Once ashore, the Allied leadership floundered to devise an operational strategy to finish the campaign. Even after the success of Operation COBRA, General Bradley felt compelled to disperse his combat power by sending VIII (U.S.) Corps into Britanny to seize ports there. The emphasis on gaining and holding the OVERLORD lodgement area resulted in a lack of combat power at the decisive place and time — to close the Falaise Gap before the German army could escape. The poor performance of the Canadian and British armies in closing the gap from the north only exacerbated the problem. As a result, 100,000 German soldiers escaped the jaws of the trap at Falaise and 240,000 Germans escaped the potential trap across the Seine River. By any accounting, the Allied performance at the operational level of war was sorely lacking. Allied generalship comes in for rough treatment from Blumenson's pen. General Eisenhower's unwillingness to intervene in operational details led to a lack of decisiveness at the highest level of command. Field Marshal Montgomery's inability to work within the confines of a coalition and his lack of drive prevented the close coordination of Allied ground forces necessary to achieve victory. "Of the verve and arrogance formerly characteristic of him, only the arrogance was visible," writes Blumenson. General Bradley's leadership vacillated between "flaming independence and depressing doubt." In short, Bradley did well when his subordinates carried the load for him, such as General J. Lawton Collins did during the planning and execution of Operation COBRA. Only General George S. Patton, Jr. survives as a positive model of generalship, which should not surprise one since the author is also the editor of The Patton Papers. General Patton understood the need to destroy the German army in Normandy before launching pursuit operations, and he felt his Third U.S. Army was in the perfect position to accomplish the task. Inter-allied jealousies and lack of positive direction from the commanders above him prevented Patton from accomplishing his goal.

The book's faults are rather minor. There are not enough maps to support the narrative, a problem easily solved if one has access to the excellent maps in the "Green Books," the official Army history of World War II. Blumenson's belief in General Patton as the potential savior of the Allied cause is occasionally overdone; one wonders if Patton would not have had some of the same problems as Montgomery in con-

ducting combined operations as an army group commander. Nevertheless, Blumenson's arguments are forceful and his conclusions sound.

The Battle of the Generals should be on the shelf of every serious student of World War II and those interested in the art of generalship and combined operations. Blumenson wrote his original treatment of the battle of the Falaise Gap, Breakout and Pursuit, as an official Army historian. The constraints of his position led him to temper his judgments, but 30 years later Blumenson is much more critical of the Allied operations in France than he was in the wake of the successful conclusion of the war. The facts are not necessarily new, but the interpretations are fresh and full of insight. The Battle of the Generals may not be an untold story, but it is a story well told indeed.

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Lines in the Sand by Deborah Amos, Simon & Schuster, 1992. 223 pages. $21.00.

Expert Witness: A Defence Correspondent's Gulf War, 1990-91, by Christopher Bellamy. Brassey's. 1993. 252 pages. $29.95.

With the world's attention focused on peacekeeping operations in Somalia and the former Yugoslavia, it is hard to remember the political and military triumphs of Operations DESERT SHIELD and DESERT STORM just three years ago. Two recent books by journalists, one a veteran Middle East reporter for National Public Radio, the other the defense correspondent for the British newspaper The Independent, shed new light on that recent but already fading war.

Deborah Amos, who has reported from China, Poland, and Afghanistan, spent five years learning the culture and languages of the Middle East from a home base in Amman, Jordan, before the Iraqi invasion of Kuwait in August 1990. She reported on the killing fields of southern Iraq during the Iran-Iraq war and investigated the Iranian fundamentalist treatment of women from underneath her own black chador. Lines in the Sand is her personal view of DESERT SHIELD and DESERT STORM; it emphasizes political relations among the nations of the Middle East, their treatment of women, and the effects of the war upon both. Not a book that would appeal to most military readers at first glance, Lines in the Sand offers insights that would never appear in most works by military authors.

Lines in the Sand begins with a description of the Kuwaiti Shaheed (Liberation)

Brigade, recruited from refugees who fled their country after the invasion but were ready to fight house to house to retake Kuwait City with the assistance of U.S. Special Forces and Air Force liaison teams. The Brigade brushed off casualties on its way to Kuwait City, but was brushed off in turn by the al Sabah Kuwaiti royal family, which cut all communication links with the resistance forces in the first hours of the ground war. "Palestinians, Kuwaiti Shiite and Sunni Muslims, antiroyalists, all fighting together in Kuwait, were not welcome in the new world order envisioned by the young al Sabahs." The spirit of independence of those who had stayed and fought presented a challenge to the traditional rule of the royal family.

Insights like this are the true strength of Lines in the Sand. Amos does the best job this reviewer has seen of untangling the complicated political and social forces which complicate the modern Middle East for the average observer. She explains, for instance, that the big losers of the Gulf War were not the Iraqis but the Palestinians, thousands of whom lost their jobs in Kuwait as a result of the Iraqi invasion. In Chapter Seven, "Another Kind of Peace," Amos gives the example of Zaki Rezeq, a Palestinian who after 17 years working in the Gulf Bank of Kuwait City fled to Jordan in September 1990. "There's no possibility of going back to Kuwait now, but we hope," she quotes Rezeq. "While we were there, we were treated like Jordanians, and now we are treated like Kuwaitis."

The big winners of the war, on the other hand, were the Saudis and, less obviously, the Syrians. King Fahd, who made the most significant decision in Saudi history when he invited the American military to protect his nation, survived that desert storm and saw the winds of change affect his domestic politics as well. On March 1, 1990, the King presented a new "Basic Law" in a nationally televised presentation; the guarantees of personal freedoms and civil liberties, based on a sort of constitution rather than religious edicts, and a 60-member Conservative Council which institutionalized popular participation in government, were landmarks in the road away from theocracy. The American security guarantee would now protect a more liberal state.

Hafez al Asad, the President of Syria, parlayed his military support for Saudi Arabia and Kuwait into substantial aid from both countries and diplomatic recognition from the United States. Asad, described by a U.S. Secretary of State as a "proud, tough, shrewd" negotiator who "plays out the string to absolutely the last possible millimeter," maintained his domestic political position as a leader of Arab unity despite fighting against Iraq. He encouraged the United States to pass United Nations Resolution 678, which explicitly authorized the use of force to push Iraq out of Kuwait and simultaneously provided him political cover in his fight against a fellow Arab na-

tion. Amos presents a compelling picture of one of the most important political figures in the region and explains much of the political maneuvering which kept the fragile coalition together long enough to free Kuwait.

Lines in the Sand is ultimately not an optimistic book. Amos ends with a chapter assessing progress in Kuwait a year after the war, arguing that "the invasion had done nothing to upset the traditional balance of power in the country." The al Sabahs continued to rule Kuwait with a repressive hand, and the fragile seeds of democracy which took root among the resistance fighters during the Iraqi occupation soon withered. The same is true on a larger scale throughout the Middle East, despite the moves towards political liberalism in Saudi Arabia and (to a lesser extent) Syria; the American military commitment to defend Saudi Arabia and Kuwait is the only factor which has increased stability in the region. It would be interesting to see Amos' reflections on how the peace treaty between the Israelis and the Palestinians has altered the landscape of the desert region.

Christopher Bellamy's *Expert Witness: A Defence Correspondent's Gulf War 1990-1991* is a much more conventional "military history" book, and one which more readers of *ARMOR* would be likely to pick up in a bookstore and browse through. They would be attracted by the maps, overhead satellite imagery, and photographs of military hardware, most taken by the author; nonetheless, most would put the book down,

U.S. soldiers stop for snapshots at a large highway sign, somewhat edited by departing Iraqi soldiers, north of Kuwait City. The photo was taken by an *ARMOR* contributor shortly after the cease fire ended the ground war.

muttering, "Not another book on DESERT STORM!"

This would be a substantial mistake, for *Expert Witness* is the rare book that lives up to its title. Christopher Bellamy is a defense correspondent who knows whereof he speaks; after service in the British Royal Artillery and a degree in Modern History at Oxford University, Bellamy went on to earn two more degrees in war studies and publish a handful of distinguished books on the Soviet military and the theory and practice of land warfare. It is hard to imagine a more qualified observer to report upon the British experience in DESERT STORM. Bellamy describes his purpose in writing the book as "to combine an academic approach, complete with footnotes, with first-hand experience." He also decided to stand back and wait for the dust to settle before putting pen to paper, allowing a historical perspective and a sense of how things would turn out to influence *Expert Witness*. These were good decisions which produced a very worthwhile result.

One of the drawbacks of "instant news" is that its very immediacy prevents any analysis while events are going on, while tomorrow's news stories take precedence over reviewing what happened yesterday. The flood of books which were published immediately after DESERT STORM fell prey to these weaknesses. *Expert Witness* is the first of the DESERT STORM books to look at the war from a decent perspective of years and of subsequent history. Certainly the strongest chapters of the book are the two which track events after the shooting stopped. Bellamy participated in the opening stages of Operation PROVIDE COMFORT; his comparison of the initial efforts to provide relief to the Kurds in Northern Iraq with the British relief effort in Bosnia in October 1992, in which he also participated, is sobering. He lightens it up with descriptions of British soldiers in Diyarbakir trying to get a captured tortoise to mate with a tin helmet, and comments on the usefulness of recognizing the military ranks of foreign soldiers as a means of currying favor (and finding a place to spend the night). Bellamy is not the sort of correspondent who spent all of his time in the hotels of major cities and reported only on "the Five O'Clock Follies."

In fact, Bellamy used his position as a highly respected and well-liked correspondent to see far more of the war than did most of the soldiers who were there. He speaks authoritatively of the war in the sea, the air, and on land from most of the important Saudi Arabian airfields and from the deck of a destroyer, and he was present at the signing of the peace treaty in Safwan. Throughout, Bellamy is matter-of-fact about the dangers he faced and those he chose not to, describing his decision to report the ground war from Ridyah rather than from the front lines because he could receive more information and

communicate better with his newspaper. Bellamy also candidly admits his mistakes, as when he juxtaposed the XVIIIth and VII Corps in his initial reports on the "Hail Mary" left hook of Allied forces.

One of the most important reasons to read *Expert Witness* is for the insights it provides into just how talented a good defense correspondent can be, and how important it is for military leaders to learn how to deal with the press. One of the "lessons learned" Bellamy recounts in his excellent final chapter is that the hard blow the Alliance took when A-10s destroyed two Warrior fighting vehicles was worsened by poor press-military relations. "If you make a mistake, you have to advertise it," advises Bellamy. "With media coverage as it is, and media organizations' pathological desire to find 'cover-ups' and conspiracies where none exist, you have to be very up-front about your mistakes."

In addition to the insights he delivers into dealings with the media and into the British military psyche, Bellamy offers another unique perspective: that of a trained expert on the operational level of war in both Soviet and American military theory. Bellamy understands the concept of maneuver warfare, having studied its origins in Soviet military thought in the 1920s (in the original Russian, no less), and having spent much of the 1980s exploring the evolution of maneuver warfare theory in the United States. He is uniquely well placed to explain the triumph of maneuver warfare against an army imperfectly trained and equipped by the military that originated the concept. Bellamy has a rare gift for boiling down abstract military thought and explaining its implementation in the desert through diagrams and JSTARS satellite photographs of the battlefield — theory and practice in the same paragraph.

The three years since the military triumph of Operation DESERT STORM have wrought huge changes in the international system and engendered a change in focus from warfighting to peacekeeping, from the Middle East to Eastern Europe. Deborah Amos' *Lines in the Sand* helps explain the political forces which drove the Middle East to war and begin the precarious steps to a lasting peace; it is a look behind the veil into the soul of the Middle East. Christopher Bellamy's *Expert Witness* is an academically detached yet personally involved account of maneuver warfare in theory and practice, an insight into coalition warfare from the viewpoint of one of America's most important allies, and a good hard look at the steps which led the militaries of both countries away from war into the far more difficult job of creating and maintaining peace. Both are well worth the time and effort of professional officers willing to look beyond standard accounts of Operations DESERT SHIELD and DESERT STORM.

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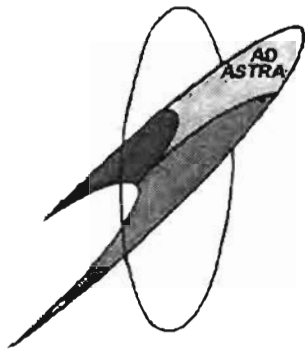
The Adoption of the McClellan Saddle:

An Early Advanced Warfighting Experiment

By SGM Anthony F. Anola and SFC John Broom

In the spring of 1855, the United States War Department dispatched three officers to observe the Crimean War and to report in general on European military developments. The three officers were chosen for their demonstrated excellence and prior experience in individual projects, and included a Captain George B. McClellan.

From September 1855 to April 1856, they traveled extensively in Europe and spoke with European officers about military methods, organizations, and equipment. On their return to the United States in the spring of 1856, they reported on their activities and observations. McClellan believed that the Army needed a new saddle. It was out of interest in, and observation of, European cavalry forces that the "McClellan Saddle" idea grew. His hands-on experience convinced him that there surely was a better way.

By applying battle lab techniques to McClellan's mission, we note that he used "off-the-shelf" technology. The saddle was a Prussian modification of an earlier Hungarian cavalry saddle. He identified requirements that would apply to the U.S. Army. Applying DTLOMS, we find that logistics, training, materiel, and soldiers were affected:

● Logistics — The rings and straps enabled the soldier to carry needed equipment.

● Training — Soldiers required training to effectively perform mounted duties with the new saddle.

● Materiel — There was some difference in saddle construction, especially in the wooden frame, or "tree."

● Soldier — Comfort was enhanced for man and beast, reducing fatigue and enabling the soldier to maintain lethality for a longer period.

After testing, Captain McClellan identified refinements to the Ordnance Department and the saddle was approved for issue. The saddle acquitted itself well throughout the Civil War.

The McClellan saddle was thought to be one of the best designs for a cavalry saddle ever developed, and, with some evolutionary improvements, would remain in U.S. service for nearly 90 years.