ARMOR

Heavy Concept: An M1-based Engineer Vehicle?

PB 17-99-1

January-February 1999

This is going to be my last "Stand To" column in *ARMOR* Magazine before terminal leave and retirement bring a 20-year career to a close. As I reach the end of this phase in my life, I'm reminded of how it began, and how life in the Army has changed ever since.

I cannot resist the temptation to offer one piece of advice — surely you can't begrudge me the opportunity to mount a pulpit one time in the four years I have been this magazine's editor-in-chief. The advice isn't just to my juniors, but to my peers and my superiors alike. A wise old "Gray Wolf" once said words to my platoon sergeant that a just reporting 2nd Lieutenant Blakely took to heart. I can't quote him exactly, now that decades have passed, but it was something to this effect: "Sergeant Patsfield, we work hard here in this brigade, and we work until the mission is accomplished, but when it is done, we play hard too."

Before you pooh-pooh those as the well-meaning but suspect words of a commander in the late 70's Army, an army which had so many problems, let me point out that the Soviet Union didn't accomplish many of its aims in that time period. The Army then **was** good enough in its milieu to handle the threat, so the Gray Wolf's words were good and were worthy of emulation.

Work Hard — Play Hard. That maxim can mean different things to a lot of people, I suppose. Some would interpret it to mean better and expanded intramural programs, with more sports participation during garrison time for everyone. Others will say it necessarily means too much Mr. Booze, and we need to keep a cap on that. To others it suggests out of control womanizing in red-light districts, a deadly habit in this day and age. And true, those negative behaviors do occur when we play too hard or have leaders who don't set good examples. It is rare now to hear leaders say much about the playing hard part of the equation except to warn their soldiers and troopers not to, because they will be hammered if they are caught hammered.

Today, any blemish looks bad in quarterly training briefings and command briefings, so it is better not to take chances. Instead, the phrase now seems to be Work Hard — Now Work Harder. No wonder that the life of a soldier seems to be ever more difficult for our recruiters to sell. Johnny with no play is an unhealthy boy and will quickly decide not to stay in.

One of my favorite leaders in the Army, a brigade commander, carried a sledgehammer with him everywhere he went. His intent was "to remind people what battlefield effect a heavy brigade has when it is used on an enemy — it ain't a surgical instrument." He and the unit were high performers in simulations AND in the dirt at the NTC, yet he routinely let his soldiers out from under his thumb between exercises. Heck, you could even feel a loosening of control when ENDEX was announced over the net.

We worked very, very hard, but we played pretty hard, too. While we worked hard, it was a fun place to work. I think you have to let yourself and your soldiers and troopers have some fun in this business, or all of the well-balanced people will leave the Army in disgust. Those who remain will be a too high concentration of anally retentive "Type As" who want to staff the staff papers to see if we need staffing papers and then brief the results at 1600 on a Saturday afternoon. Oh, and you better not make any mistakes while you do it or you won't be able to stay in the command hunt.

While in the past it might have been a good bonding exercise to hold a Friday "maintenance meeting" at the club, the repercussions today if someone makes an error in judgment are just too severe. So, as a result, we have become increasingly a force that just goes home after punching the clock and takes off its Army clothes because the job is over. Service used to be our way of life; now we are losing this aspect of service to the country. And that's part of the reason it is not much fun anymore.

A lot of people in and out of uniform complain about the way the Army is right now. On some days I even complain a little myself. But make no mistake about, while there are specific aspects about the Army which I don't like, in its aggregate I still love it, believe in it, and am proud of it.

Over a frosty mug, I have idly speculated on where I would have been now if I'd majored in business and gone that route out of school. But it is only idle speculation, for the fact is, that if faced with a magic genie chance to serve or not to serve from the beginning again, I'd make the same choice. To serve. Being a soldier, especially a tanker, was a child's dream come true for me, and I rarely ever looked back to second guess the choice.

As I sit in my office looking at the bulletin board I've decorated with militaria from various ages, I don't look so much to the past but to a future Army I won't be a part of. I have mixed emotions when I think about the exciting things which are about to happen — that makes me sad. I am elated, however, that a strong Army still exists — especially when compared to any likely foe's force — and that there are great guys in our turrets.

That said, I wish you all good luck and good hunting. I will always remain loyally yours.

— TAB

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LETTERS

Helicopters and Tanks in 2020: Not an Either-Or Proposition

Dear Sir:

While I agree with MAJ Blumentritt, that Armor will continue to play a pivotal role in land warfare for the foreseeable future, I must take issue with much of his argument regarding helicopters on the battlefield (see Sep-Oct 98 issue). Although the capabilities of the (attack) helicopter are becoming more evident, they, like the tank, are only a part of the combined arms team and not an end to a means by themselves. However to, "…use helicopters as airpower assets…" would fundamentally nullify the combined arms team, by putting the division and corps aviation assets under the control of the air component commander.

If the joint force commander uses attack helicopters as "airpower," then by definition they will be apportioned by the joint force air component commander (JFACC) through the air tasking order process. Commanders will need to plan for and request their use 48-72 hours in advance. This is in no way responsive to the ground commander's requirements. The very reason that aviation is an element of the ground maneuver force is to allow them to operate within the tempo of the ground battle. Although Army Aviation operates "aircraft," they are operated in the ground scheme of maneuver. Missions are planned for and executed in the same manner as for any other member of the combined arms team.

His assertion that aviation cannot seize ground is correct, at face value. Attack helicopters are designed to attack the enemy, not hold ground. Attack and air cavalry assets provide the commander the ability to see the battlefield, and in concert with artillery set the conditions for decisive ground operations. In fact, every heavy division commander in Operation Desert Storm, at some point, used attack aviation forward of the ground elements of their divisions, to see the enemy and set the conditions for ground maneuver. Although not able to hold ground they can "dominate" terrain for a period of time. The 24th Infantry Division used Apache helicopters to deny the Republican Guard a route of retreat to the causeway after the 100 hours. In Bosnia, the attack helicopter has been used to force compliance with the Dayton Peace Accord. Few would argue that M1A1s would have played a pivotal role in the rescue of the Rangers in Mogadishu. However, I believe that if you ask those outstanding soldiers what kept the crowds from overwhelming them during the night, they would tell you the attack helicopters of Task Force 160 played a critical role. Likewise, the Pakistani and Malaysian armor force that fought its way to the Rangers was supported by Cobra helicopters of the 10th Mountain Division, sometimes flying below rooftop level and firing into second story windows. Aviation is not the panacea of the battlefield, but [helicopters] are far more than a component of airpower. Armor and Aviation must harness the same synergy that was gained in the 1930s and World War II between armor and mechanized infantry, exploiting the mobility differential.

MAJ Blumentritt's claim that bad weather affects aviation's ability to operate is an oversimplification. In fact, weather affects all members of the combined arms team. During the AH-64D Longbow IOT&E, the weather precluded operations by the mechanized forces off of the road network, and the Longbow was the only maneuver system able to conduct normal operations. MAJ Blumentritt appears to have forgone talking with any Army aviators about our ability to operate in marginal weather conditions. In fact, both the AH-64 and UH-60 are capable of operating in up to moderate icing conditions. With the development of the fire control radar on the AH-64D, visibility requirements for attack operations will be reduced. To be sure, weather will still be a real factor in aviation operations, but less so than with fixed wing operations, not to mention UAVs.

Although "flying tanks" are still far from becoming a reality, I believe that MAJ Blumentritt's comments may go down with those made in 1914, by British General Haig, as to the capabilities of the "aeroplane" and its utility on the battlefield, or those of Air Force generals after World War II as to the capabilities of the helicopter. We must remember that many prominent Cavalry and Infantry generals had tremendous doubts about tanks, until the Wehrmacht made their utility overwhelmingly obvious.

In recent months, it has become popular to compare attack helicopters and armor as competitors for the same mission. They are not. They are complementary systems on the combined arms battlefield. Helicopters are not, nor will they be, the end of the combat arm of decision. Together, Armor and Aviation will take the fight to the enemy with the tempo that is the hallmark of maneuver warfare. As an element of airpower, apportioned by the JFACC, this cannot happen.

MAJ ALLEN L. HUBER
S3, 2-4 Aviation Regiment
4th Infantry Division (Mech)

At Least in the Near Future, Today's Scouts Will Use Bradleys & HMMWVs

Dear Sir:

On November 9, 1998, at the UDLP factory in York, Pa., a significant milestone in the history of the Armor Force took place and not a single official representative from Ft. Knox or Armor Branch was present. The M2A3 Infantry Bradley first production vehicle was delivered to the U.S. Army, and with it comes the M3A3 Cavalry Fighting Vehicle.

Whether anyone wants to admit this or not at Ft. Knox, the only new Future Scout and Cavalry Systems (FSCS) that most of the 19Ds in the Army today will ever see are the M3A3 Bradley and the Long Range Acquisition System (LRAS) HMMWV. It's time to take our heads out of the sand and start figuring out how to best utilize the awesome capabilities of these systems. While it's nice to have a group working on the international FSCS program that may give some future generation of scouts a new system, we had better expend more energy on optimizing the new systems we are getting now. Armored, 24-hour-a-day, on-the-ground reconnaissance and economy of force operations are essential to the success of combined arms operations. Protesting we can't get the job done without FSCS is ludicrous.

Most do not even know that the new acquisition systems on these vehicles contain not only very high resolution second generation FLIRs but also daylight CCD TVs. These systems, coupled with the digital databus architectures of the vehicles, give us unprecedented reconnaissance capabilities. Absolutely no effort has been expended by the combat development community at Ft. Knox to influence the design or equipping of the M3A3 configuration vehicles beyond what every mechanized infantry squad will have in an M2A3 IFV. This is criminal.

No significant effort has been devoted to study or influence the design of the internal rear configuration of the Bradley M3A3. In the M2A3 Infantry configuration, there is a wonderful flat panel display where the dismount squad can look through either the gunner's sight, the commander's sight, the driver's thermal viewer, or see the digital command and control data available to the commander. Think of what could be done if we had put multiple displays and additional receiver radios in the M3A3 so that scouts in the back could look at all of these sensor outputs and the downlink data from Apache Longbow MTI radar and UAVs that may be operating in their area.

We are putting a very expensive mast-mounted LRAS system on a HMMWV that has virtually no protection. It could have been mounted in the right rear of the M3A3, eliminating a vehicle from the force and providing for even more sensor fusion on board the M3A3. When moving, the stabilized gunner's IBAS and commander's CIV would provide the primary target acquisition capabilities, and when stationary, the large aperture LRAS mast-mounted sensors would provide the extended range capabilities needed. What we have now is two half reconnaissance systems.

There are no good acoustical sensors in either ground system, yet the Field Artillery is procuring the BAT munition that has an excellent sensor array which could also have been mounted and integrated on the M3A3's mast. As a battalion commander, I bought Steiner 15x80 binoculars with internal compasses in them for my scouts. These binoculars and the new lightweight laser designators and pointers need to be on the BII of the M3A3.

We also need to look at the integration of some of the Land Warrior and dismounted LRAS technologies for our dismounted scouts so that they can stay electronically tethered to the M3A3 yet work in areas where vehicle exposure needs to be minimized.

From a purist standpoint, the M3A3 Bradley is a terrible scout vehicle. It's big, at 133 inches to the top of the CIV, and heavy, at 33.5 tons, but it's the best we're going to have for a long time. Let's make the best of it instead of crying about what we could have in 15 more years. We need to work on its visual, acoustic, and thermal signatures, and we need to get more sensors, radio receivers, and integration capability on board. These are all within the realm of the possible for product improvements and the budgets of today.

For those who think it's more important to expend all of our resources trying to get a new FSCS, I remind you that in the 1970s, the Armor leadership chose to ignore the M3 CFV development and upgrades, thinking a new scout was just around the corner. It's twenty years and one war later. It's time we faced reality and our responsibility to equip today's scouts with the best we can. Remember – better is the enemy of good enough.

CHRISTOPHER V. CARDINE
COL (Ret.), Armor/Cavalry

Thoughts on Battle Command Article From a Career Fire Supporter

Dear Sir:

The September-October 1998 issue of *ARMOR* contained the article "Battle Command Insights," by LTC James E. Zanol. This article included a section entitled "Lessons of Fires," which was breathtaking, absolutely stunning. I have been a 13F (Fire Support Specialist) for 17 years and have never seen a clearer explanation of the application of fire support at the brigade level. It should be memorized by every armor, infantry, combat aviation, and artillery officer.

During my time as a fire support sergeant, the soldiers I have learned the most from about fire support have been a couple of maneuver commanders at the company team and battalion level. This wasn't because they had special technical knowledge of any fire support means, but because they understood the most important battle command lesson: maneuver commanders are *solely* responsible for synchronizing their own combat power. They were excellent tacticians (not technicians) who understood that they needed every advantage, every shred of firepower to win.

The really good maneuver commanders I have served under expressed a clear and easily understandable intent and did not leave the planning or execution to their staffs without close involvement (not micro-management). Otherwise, separate plans would be developed, unrelated to the commander's intent, which would usually result in a disjointed, piecemeal, and unsynchronized execution of the battle plan. I have witnessed many such fiascoes at both NTC and CMTC.

LTC Zanol's article focuses on the really important factors in a successful fire support plan: mass, simplicity, focusing on targetable high payoff targets (HPT), flexibility, and timeliness. On numerous occasions during BCTP and BBS simulations, as well as NTC and CMTC rotations, I have seen fire support assets squandered by engaging too many unimportant targets. It is better to attack one critical HPT with everything available than to fritter away limited assets on unimportant targets. This requires close control of observers and maneuver commanders who clearly understand the commander's intent. There are not enough fire support assets to service every request. Someone is going to have to go without.

I also agree with his targeting criteria, that the target must be stationary. I have tried to engage moving targets with artillery at NTC and have never been successful with conventional munitions. There are just too many variables, including target location error, to be consistently successful. Moving targets should be engaged with artillery only when precision guided munitions are available.

Fire supporters of all branches and services are technicians by trade. Both the Field Artillery and Military Intelligence are highly technical. Successful integration of fire support depends on the tactical application of technical means. Maneuver commanders must train fire supporters to be both tacticians and intelligence analysts in order to engage the truly critical HPTs.

I would recommend that all maneuver and fire support soldiers copy LTC Zanol's article and read it daily. It summarizes every important fire support principle in the FM 6-20 series (*Fire Support in the AirLand Battle*) in just a few pages. I really don't think anyone could improve upon it.

SFC SCOTT E. ROGERS
Squadron FSNCO
1st Sqdn, 3d ACR

Working Rules of Engagement Into Future Training Scenarios

Dear Sir:

CPT Dan Froehlich has made a significant contribution to the Armor community in his article "Training Rules of Engagement: Beyond the Briefings," published in the September-October 1998 issue of *ARMOR*. Rules of engagement (ROE) are all too often viewed as hindering mission accomplishment, and at least part of the reason is our failure to achieve an appropriate comfort level with ROE during training. R-A-M-P, as described in CPT Froehlich's article, is an exceptional tool to teach ROE to soldiers and their leaders **now**, before they get caught up in the heat of the moment. The alternative to effective training is increased potential for allegations that force was used in violation of ROE or, fully as important, that the mission was compromised because legitimate force **wasn't** applied.

R-A-M-P is not a replacement for well-drafted ROE, which must be tailored for particular missions and be consistent with directives from higher headquarters. Rather, by ensuring soldiers understand fundamental rules governing the use of force, R-A-M-P provides a predicate for specific ROE. Moreover, R-A-M-P is easily incorporated into unit STX training and classroom training at all levels. The Center for Army Lessons Learned recently published several booklets containing ROE vignettes useful for both field and classroom training. Judge Advocate instructors at the Armor School presently use these vignettes, R-A-M-P, and specific ROE from actual deployments in Law of War classes for junior officers. Operational law Judge Advocates are available to help TOE units organize similar training.

In 1999, the U.S. Army Armor Center will open an innovative training site for Mounted Operations in Urban Terrain (MOUT). Training scenarios at the site will prepare mounted warriors and combat support elements for both domestic and foreign contingency operations. Familiarity with ROE is critical for units preparing for MOUT training and, ultimately, real world contingency operations. R-A-M-P is ideally suited for this purpose and CPT Froehlich's article underscores this important proposition.

JOHN E. BAKER
COL, U.S. Army
Staff Judge Advocate
Ft. Knox, Ky.

Training at Platoon, Company Level Must Be Real, and Realistic

Dear Sir:

I could not agree more with COL Guy Swan's letter (*ARMOR,* Jul-Aug 98) reference training in today's Army. I concur with COL Swan's assessment that most units training at our CTC's fail to execute at the icon level. In fact, there may not even be a linkage between the division warfighter and the missions executed at the CTC.

While I do not suggest another study, I do think it is time for all of us to re-look how we are approaching training. I think this is especially true for those of us who are more senior in rank. Personally, I think the training doctrine is fine. I suggest that how we are executing that doctrine may be a problem.

While all training is important, we must ensure that we are producing units at the platoon and company level that are capable of winning engagements. I think most of our battalion and brigade commanders can look at platoons and companies and determine if that training is meeting the requirements to win those engagements. You get better the more times you repeat specific training events provided you get good feedback on what went right and what went wrong (the AAR process).

COL Swan's command got better with each execution of a training event and his platoons and companies have more training events per year than any unit in our Army.

It is time that we put as much effort and time into platoon and company training as we do for the division and corps warfighters. We should protect the training time for these units with the same zeal that we protect the division and corps training events. We should insist that battalion and brigade commanders be at platoon and company training events versus meetings at division and corps headquarters. Senior leaders at all levels should encourage commanders to send their executive officers to meetings so they can observe training and coach and mentor their subordinates in critical warfighting skills.

I hear a lot of complaints about lack of maneuver space. What post does not have space to maneuver a platoon or a company? Use the simulations to enhance our ability to fight our larger formations but not at the expense of where the real fighting is accomplished.

Finally, I think most of our young leaders and soldiers love soldiering in the field when they are fully engaged and can see the actual benefits of their work. They appreciate the commander and command sergeant major that knows his profession well enough to point out better, more effective ways for them to employ their unit to achieve success. These soldiers stay because this is what they joined to do, not puck some icon in the simcenter.

JAMES E. SIMMONS
COL, AV

Officer Turnover Makes Leaders Appear To Be "Transients" To Men in Their Units

Dear Sir:

Yes, COHORT CAN work IF personnel management policies support it. But, if COHORT exists in only one place, such as the 7th ID(L) or a unit preparing to go to Bosnia, hiccups are bound to appear elsewhere throughout the Army. Current personnel policies (individual replacements) and COHORT are antagonistic. They can't co-exist very well, if at all. The problem is not *too few* officers and NCOs but *too many* officers that have to get their platoon or command time before moving on to the next job. For COHORT to truly work and create cohesive, highly effective units, officers have to be stabilized within those units. We would have to fill units with officers, NCOs, and soldiers, and then keep them together for an entire life-cycle (3 yrs). That would mean that some officers won't "get their chance." We would have professional staff officers who would never get into a platoon leader or command billet unless they eventually prove themselves worthy. That would require battalion and brigade commanders to make the hard call about who is going to get the platoon leader or command position and who is not. Under the present system, everyone gets their turn! What is best for the unit, is not best for the individual.

COHORT works and creates extremely effective units *if* it has good officer and NCO leadership that understands the unique challenges and stresses of this type of unit. (See Dr. Kirkland's Walter Reed Army Institute of Research (WRAIR) Tech. Report No. 5, Unit Manning System Field Evaluation, dated 17 June 1987.) The report cites "the deleterious effects on cohesion of rotating key company level leaders." The current officer personnel management system requires that company-level commanders change every 15-18 months (in many cases even sooner) in order to give every captain his turn. I was a battalion S3 in the 82d Abn Div Arty and saw battery commanders change frequently. I even had to change out after 12 months although I was getting good at my job. If the unit is lucky, it gets a good commander for the next 18 months. If not, they have to wait 18 months until they can get rid of the guy. The NCOs (esp. in the 82d) tend to stay in the same unit for several years. That's stability. The soldiers stay, as well. Officers are the wild card. That does nothing to enhance unit stability and cohesion (or combat effectiveness).

The first light infantry division "entailed significant changes from traditional practices in the U.S. Army." Rather than relying on logistical superiority and overwhelming an enemy through attrition, the light infantry division had to be able to deploy to an austere contingency area and win through "soldier power," the military proficiency of small groups of lightly armed soldiers. The limitations on airlift wouldn't support a massive buildup of logistics or combat power. This concept is not new; the airborne fought through Normandy during WWII like this. The report defines "soldier power" as the "synergistic product of intensive, progressive training rigorously focused on the combat mission, experienced leadership, and horizontal and vertical cohesion." It goes on to say that, "the COHORT system makes possible the development of interpersonal cohesion essential to small forces operating independently in hostile environments." Staying together as a unit for three years makes this possible.

The CSA published a White Paper on Leadership in 1985 (following the White Paper on Light Infantry Divisions in 1984) that proposed relationships between leaders and subordinates based on mutual trust, respect, affection, and dedication to a common purpose. The principles call for open, complete, and truthful communication both up and down the chain of command. The CSA recommends that leaders empower their subordinates by granting them discretion commensurate with their competence, involving them in decision-making, and relying on the ability to function autonomously within the boundaries of their missions. I have experienced this type of environment only once in my career, while assigned to the 7th ID(L). I tried to bring it to the 82d Abn Div, with partial success, when I was assigned there as an S3.

The closest we came to institutionalizing a unit manning concept was General "Shy" Meyer's recommendation that we adopt a regimental system similar to the British system. What we have now is only a shadow of what he really intended. His concept was that officers and NCOs would remain with the same regiment for their entire careers and would not be forced to move up or out. Rather, they could remain at their current grade so long as they remained competent. The idea emphasized stability and cohesion, something we currently lack.

The current officer personnel management system emphasizes the officer's career development through narrowly defined "wickets," rather than unit cohesion or effectiveness. Unfortunately, these personnel policies undermine combat readiness. Kirkland's 1987 Tech Report states, "the most destructive behavior occurred when an officer was viewed as trying to further personal ambitions at the expense of the soldiers ... Rapid turnover of lieutenants as platoon leaders made both officers and their troops feel that the lieutenant was not part of the platoon, but a transient." This unit replacement policy is reminiscent of personnel policies in place during the Vietnam War in which many officers were viewed in the same manner by their troops. Kirkland writes, "the perception most damaging to vertical cohesion was that officers' careers mattered more to them than did the welfare of the unit." Haven't we learned something since our experience in Vietnam? We're still managing personnel piecemeal, rather than as units!

Kirkland's Tech Report didn't just focus on what went wrong in the COHORT system but found many examples of units that "got it right." He and his co-authors give many suggestions about what ingredients were common to high-performance units. These ingredients included technical and tactical knowledge, respect for subordinates, trust in subordinates, a power-down style of leadership, caring and a focus on the mission (setting clear priorities and shielding soldiers from higher HQ requirements that weren't mission-essential). "Constructive commanders used their staffs to fight higher headquarters to get personnel and equipment, shortstop requirements, and alleviate their subordinates' anxieties."

Kirkland makes an indictment of the prevailing Army culture. "It was clear from the experiences of these light infantrymen and artillerymen that the current Army culture does not support vertical cohesion or the capability to operate autonomously. Rather, the Army culture teaches leaders that the appropriate reaction to pressure is to centralize control, put on a good show, and sweat the troops (remember the quote "treat them like animals?"). This is not because leaders are weak or evil; it is because they have been raised in an Army culture in which the prime assumptions are that no one will do his best unless he

is pressured and closely checked, that being good is meaningless unless you look good, and if you look good no one will check further, and that I won't be here when the facade I have created crumbles." The implications of this statement, if true, are enormous for readiness and deployability issues.

The writer states that he has not read any systematic study of the COHORT system on a service-wide basis. I encourage him to read the WRAIR studies on the light infantry division and the COHORT system. They conducted extensive observational research and conducted numerous interviews over a multi-year period to come to the conclusions I referred to above. He might also read the two CSA White Papers referenced in this essay.

These issues are critical to our Army. With battalion command being the Holy Grail of career success, most officers are risk-averse and want to avoid doing anything that would jeopardize their next rating. This type of climate does nothing to encourage risk-taking, empowering subordinates, or building the most combat-effective units. The fruits of a power-down leadership style take too long to realize for most. They are not immediate, and when a single OER can make the difference whether you will make the battalion command list or not, most officers simply won't risk it. Our Army culture punishes risk-takers. It doesn't allow mistakes. (If you can't make mistakes, how can you learn?) It actually works against creating the most combat-effective units! Doesn't this tell you that something is wrong?

Another writer responded to my piece yesterday by stating that the resiliency of the enlisted soldiers of our Army keeps it strong. He's right. But I think it is a shame that they have to be resilient to negative internal pressures that we could eliminate by overhauling our officer personnel management policies.

I hope the Army's bold experiment of the 1980s, the light infantry division and the COHORT unit manning system, are not left on the dust pile of history. I fear we are returning to a system that was in place during Vietnam and failed us then.

WILLIAM F. ADAMS
LTC, FA
PMS, Duke University

Further Comment Clarifies Soviet and Russian Radio Bands

Dear Sir:

I saw the comments about Adam Geibel's article in the new issue of *ARMOR* and noted that the major made a slight error in his comments on radio types. In Russian, they use the abbreviations "KV" and "UKV" for military band radios. KV is "Korotkiye Volny" or short wave, which to them is what we term HF — usually 1-11 MHz on their radios, like the old R-130 series. UKV is "Ul'trakorotkiye Volny" or "Ultra-short Wave" which corresponds to our VHF. The radios here are either from 20-51.5 MHz or 30-80. The R-163-xxK series are HF radios; the R-163-U series are mostly in the 30.000-79.990 MHz range, and the R-163-50U is one of those. It replaced the R-171 and R-111 series radios as a 50-watt command set. The R-163-10U is the normal set, and the R-163-UP is just a receiver, as the major noted.

STEPHEN "COOKIE" SEWELL
CW2 (Ret.)

Seeking 33rd Armor Members For Historic Registry

Dear Sir:

Could you mention our efforts to document the history of the 33rd Armor Regiment and its members, from its inception in 1941 through its many changes in the mid-1980s and 1990s? We ask anyone who served in any battalion of the 33rd Armor Regiment to contact us so that we may add them to our registry.

We are also establishing a new website at http://www.readyfirst.com/2-33Armor/

BRYAN SMITHERS
HHC 2-33, 1st Bde., 3d AD
1976-1979

Use Sandbags to Protect Vehicles When Strapping On Claymore Mines

Dear Sir:

As always, I thoroughly enjoy your magazine. I have one comment about SFC Thompson's excellent article in the July/August issue. On page 13, he says "Another similar technique was strapping Claymore mines to the outside armor of the tank with the clackers marked as to position inside the driver's compartment."

This may damage the host vehicle, particularly a thinner-skinned vehicle such as a Bradley, M113, or truck. In every case, the M18 should be placed against a filled sandbag and not directly against the hull. When Claymores were detonated against the sides of vehicles during the Vietnam War, it caused "excessive" damage to the host. To decrease the damage, a miniature Claymore (sometimes called a "dirk," "mini-more," or a "Claymorette") was developed by the Limited War Laboratory at Aberdeen Proving Ground. Even with the miniature Claymore, the host vehicle still suffered "significant" damage. (See *Claymore Mines, Their History and Development,* by Larry Grupp, page 123.)

Another technology, developed by FMC Defense Technology Laboratories, used a less destructive, slow-firing counter-ambush device that could be placed in multiple units on the sides of the vehicle. This device was made up of many rows and columns of short, aluminum barrels, each holding a .22-cal. Long Rifle cartridge. The back surface was a propellant sheet that burned and caused the cook-off of the .22s over about a minute duration, sounding like popcorn. It was intended to keep enemy heads down long enough to allow our personnel to take action. (Draft TM 9-1095-254-14, *Operator, Organizational, Direct Support, and General Support Maintenance Manual (Including Repair Parts and Special Tools List) for Counter Ambush Barrage Weapon System XM55*, Frankford Arsenal, September 1970.) The Rhodesians also improvised a number of interesting counter-ambush devices (See *Taming the Landmine,* by Peter Stiff, pages 79-83. A "Minimore" was commercially available as recently as 1987).

MAJOR WILLIAM SCHNECK
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Letters Reflect Real Concerns About Simulations Versus Reality

Dear Sir:

I was perturbed by your views in "Stand To" in the July-August issue of *ARMOR*.

Specifically, your belief that the present flow of letters to the editor, "indicate that there is much more going on than worried, paralysis-inducing, woe-is-us hand-wringing..." "who are sounding Chicken Little, sky-is-falling alarms..." and "that behavior is counter-productive and only spreads panic when panic is in no way warranted."

On the contrary, rather than a sense of panic, you might interpret the increased number of letters to the editor as a strong indication of the increasing concerns of both active and retired officers and NCOs to the *dangerous trends* that they perceive in their U.S. Army and their Armor Branch, trends that if continued could lead to an ineffective army incapable of performing its national defense missions.

Consider COL Swan's recent letter (Jul-Aug '98) in which he states his concerns over "the funding and development priorities weighted heavily toward virtual and constructive simulations and away from live, FTX-based training. These computer-driven simulations will dominate the so-called "second training revolution."

From my perspective, based on 31 years of service, with command experience from platoon-company-battalion-brigade; wartime experience in Korea and Vietnam; and training experience in the U.S., Europe, Asia, and the Middle East, I strongly endorse COL Swan's concerns. I believe the U.S. Army should give live, FTX-based training first priority in funding and allocate only small funding for research and development for computer-driven training simulations.

It should be recognized that live FTX-based training serves important requirements – the testing of tactical doctrine in the harsh realities of field operations, the testing of weapons and equipment, and finally the testing of leaders.

DUQUESNE A. WOLF
COL, U.S. Army (Ret.)

Training for Tomorrow

by MG George H. Harmeyer, Commanding General, U.S. Army Armor Center

The challenges of training the U.S. Army's mounted forces in the post-Cold War strategic environment are tremendous. We must train and sustain readiness for full spectrum conflict and expect to deploy anywhere in the world on short notice. These deployments will feature tailored packages of forces, to include the Reserve Component, and will require us to employ Information Age technology against multiple and asymmetric threats. The increased deployments of the Army's mounted forces in an era of fixed and constrained resources means, at least in the near term, a dramatic decrease in available training dollars for non-deployed units.

In recent years, every Armor and Cavalry unit in the Army has used virtual and constructive training devices in concert with live training exercises to offset this curtailment of available training dollars. However, the training unit has borne the burden, to some degree, of managing the installation/institution training plan, as well as the unit's tactical proficiency plan, derived from its METL.

Managing decreasing and turbulent resources is the central focus of an emerging Mounted Training Strategy (MTS) that we have initiated here at the Armor Center. This training strategy will include a workable model that will allow unit commanders to execute well resourced training given today's constrained resources. Moreover, the different training environments in CONUS, USAREUR, and Korea require that the Mounted Training Strategy be tailored to meet each MACOM's demands — its mission, training environment, and training resources.

The central tenet of the new training strategy is simply this: The Army's core competency is developing combat ready soldiers, competent and well-skilled staffs, tactically proficient and confident leaders, and finally, "killer" platoons and companies that are able to dominate any threat across the spectrum of conflict. Small unit excellence is the key component of our strategy as they establish the basis for success on future battlefields. With that as our focus, the Mounted Training Strategy must:

- focus on resourcing pre-deployment combat proficiency levels
- include Training Support Packages after receipt of mission and mission rehearsals
- plan for sustainment training while deployed
- place renewed emphasis on the conduct of annual unit EXEVALs
- identify core tasks to be trained and the number of annual iterations to prevent atrophy
- account for personnel turbulence
- maximize the training potential of all training environments - live, virtual, and constructive
- support AC and RC environments
- support Campaign Plan XXI - Warfighter, Warrior, and WarMOD
- justify training resources
- be tailored for each MACOM

The Mounted Training Strategy will define a pre-deployment training readiness level that is achievable within current training resources and incorporates Training Aids, Devices, Simulators, and Simulations (TADSS). The methodology incorporated into the Mounted Training Strategy is based on core tasks that are trained quarterly, either in the virtual or live environment at the platoon and company level. The MTS will allow commanders to conduct multi-echelon training so that platoons and companies train as the battalion and brigade staffs and leaders are trained in the constructive, virtual, and live environments by maximizing the training environment based on available resources. The goal of this strategy is to develop soldiers, staffs, leaders, and units proficient in the core tasks. This is paramount to sustaining and maintaining training readiness in preparation for receipt of a mission order. The strategy is the same for the Active Component and the Army National Guard, with the required level of training readiness based on time available to execute the strategy. By integrating core tasks, this strategy is able to apply new training technologies and approaches, justify the resources required to maintain training readiness, and to support the development and acquisition of new materiel and information systems capabilities. The MTS enables us to describe how and where to use TADSS and the training required to maintain readiness — both pre- and post-mobilization.

As our new training strategy emerges, several new training technologies currently being fielded will greatly assist our training efforts. These systems are the Close Combat Tactical Trainer (CCTT) and the Tank Weapons Gunnery Simulator System and Precision Gunnery System (TWGSS/PGS). The CCTT provides a virtual environment for our units to train, sustain, and rehearse, which greatly complements that training con-

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Armor Force NCO Academy Update: New Facilities, Enhanced Courses, Larger Student Load

by CSM David L. Lady, Command Sergeant Major, U.S. Army Armor Center

Our Noncommissioned Officer Academy, ably led by CSM Kevin Garvey, has been extremely busy this past year. The staff has moved into renovated facilities; they have rewritten both 19D and 19K ANCOC Programs of Instruction (POI); they have written the M1A2 BNCOC POI; and they have enhanced 63E and 63T POI. All this was accomplished while providing superb instruction to the future vehicle commanders, platoon sergeants, and maintenance team chiefs of our Armor Force. We owe the cadre a great deal, and should all be proud of their accreditation by the TRADOC team earlier this year.

Let me give you the bottom line up front: Send your ANCOC student to the class he is scheduled for by the Army Training Requirements Resources System (ATRRS). The CY 1998 SFC selection list is so large that both 19D (two classes) and 19K (three classes) ANCOC are at maximum student load. NCOs deferred from the first classes will very likely have no place in the subsequent classes. We will not violate instructor to student ratios and put learning at risk. If you defer your NCOs from the scheduled class, counsel them that you are probably deferring them for the entire year. Better yet, don't defer them.

As your sergeants arrive, they will find completely remodeled classrooms, with fiber optic wiring to facilitate the opportunities of TRADOC Classroom XXI initiatives. Student living facilities have been remodeled, and the entire renovation project supports a "campus-like" environment where students can become totally immersed in a challenging and professional leadership environment.

19D and 19K BNCOC POIs were rewritten in 1997, incorporating up-to-date training in such areas as Operations Other Than War, and the lessons of the Army's Advanced Warfighting Experiments. Over this next year certain subjects will be rewritten again, to add training in digitized command and control equipment. While we are adding digital TTPs, we are not necessarily replacing the analog TTPs. Some units will not have the digitized equipment for several years; Scout and M1A1 BNCOC must meet the needs of the entire force during the fielding of digitized systems.

The first M1A2 BNCOC class will begin in July, 1999. The number of available seats will coincide with the requirements of the modernized force, and with the fielding plan for the M1A2 tank. The target audience is NCOs currently assigned to an M1A2 unit; who will attend the course in TDY and return status. The academy has made provision for soldiers in a TDY enroute status, who will be assigned to an M1A2 unit upon completion of the course. These NCOs must already have completed the M1A2 Tank Commander Certification Course (TC3) at Fort Knox prior to enrollment into BNCOC (and have already been awarded ASI K4). As BNCOC is not an ASI-producing course, NCOs would be at a great disadvantage if they attended A2 BNCOC without the TC3 Course. The A2 course will not be offered as many times annually as M1A1 BNCOC, so units must pay attention to the schedule (See Table 1). Final determination will be made by the academy at "fill day," to ensure that the right NCO is in the right course.

63E and 63T BNCOC have increased emphasis, during the STX, on the planning, set-up, and orchestration of the Unit Maintenance Collection Point (UMCP). These NCOs will now be able to participate in Quartering Party activities, as well as to secure, feed, support, "jump," and defend the UMCP. They learn much more than just maintaining the unit's equipment. Unit commanders and maintenance officers should take advantage of this training, and make the new maintenance team chiefs responsible for the entire mission during deployments. Let them "run with the ball."

Our SSG(P)s will find totally rewritten POIs as they arrive for ANCOC. The bar has been raised, as our training developers have emphasized the horizontal alignment between ANCOC and the Armor Officer Basic Course. More than before, our NCOs will be taught to succeed as acting platoon leaders. Digital

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Course Number	Class Number	Report	Graduate
ANCOC			
250-19D40	001	31 Jan 99	14 May 99
	002	01 Aug 99	16 Nov 99
020-19K40	001	10 Jan 99	09 Apr 99
	002	12 Sep 99	10 Dec 99
BNCOC			
250-1-19D30	002	03 Jan 99	26 Feb 99
	003	24 Jan 99	19 Mar 99
	004	28 Mar 99	19 May 99
	006	18 Jul 99	09 Sep 99
	007	08 Aug 99	30 Sep 99
020-19K30 M1A1	003	03 Jan 99	26 Feb 99
	004	24 Jan 99	19 Mar 99
	005	07 Mar 99	28 Apr 99
	006	28 Mar 99	19 May 99
	008	18 Jul 99	09 Sep 99
	009	08 Aug 99	30 Sep 99
020-19K30 M1A2	501	18 Jul 99	16 Sep 99

TABLE 1: CLASS SCHEDULE FOR FY 99

The Future Scout And Cavalry System - (FSCS)

Technology Overview, Critical Program Issues, and Design Considerations

by Dr. Asher H. Sharoni and Lawrence D. Bacon

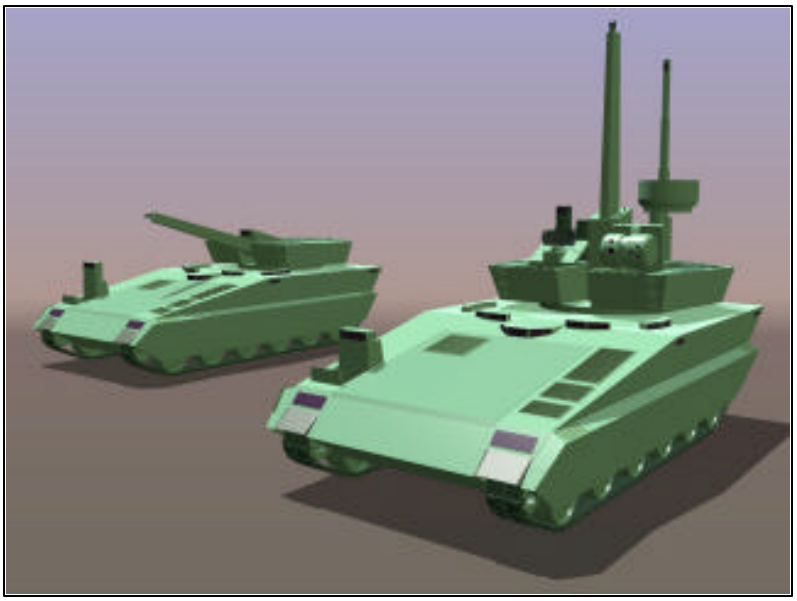
Editor's Note:

In past issues of ARMOR, the authors of this article have discussed and illustrated some fascinating combat vehicle concepts, including a future main battle tank design that won ARMOR's 1993 tank design contest.

Currently, Britain and the U.S. are collaborating on a joint design for a future scout and cavalry vehicle that would replace the HMMWV and Bradley in U.S. service.

Authors Sharoni and Bacon join the dialogue with this article, which – it must be stressed – is an independent, conceptual design, not to be confused with the U.S.-British Tracer/FSCS final concept.

But I think you will find their discussion of scout and cavalry requirements as interesting as the vehicle they have designed to meet these needs.



A Short Overview of the Ground Surveillance and Reconnaissance Role

Mechanized tactical surveillance and reconnaissance scout and cavalry vehicles have been the traditional 'eyes and ears,' serving the tactical commander and front combatant units since WWI. In past days, mainly due to immature or virtually nonexistent technologies, there was an acute insufficiency of long range, multiple-sensing capabilities. Consequently, these highly maneuverable and lightly protected mounted units were oftentimes assigned the ungrateful but critical role of serving as human 'bait.' When a potential enemy could not be detected, they had no choice but to attract enemy fire by deliberately exposing themselves at the front line. Once a well-concealed enemy force revealed its position, it lost the critical element of surprise. Consequently, tactical commanders were able to plan their tactics and respond with much higher probabilities of success, ostensibly avoiding catastrophic encounters with the enemy. Stringent operational requirements have been posted for a small and light vehicle featuring a low profile, increased agility, and improved mobility to enhance its survivability. These requirements led to various vehicle configurations that were inadequately protected — if at all — thereby suffering a highly disproportional casualty rate when exposed to hostile enemy fire.

The last three decades or so have been characterized by efforts of upgrading and modernizing old and new main battle tanks (e.g. M60A5/M1A2SEP) and medium/heavy armored personnel carriers (e.g. M113A3/M3 Bradley). These vehicles have been improved to enhance their firepower, mobility, and in particular, their survivability. Current scout vehicles in use by the U.S. Army that served well in their heyday were originally designed while maintaining their particular mission in mind. Nonetheless, they can no longer be regarded as clandestine and effectively operate in the electronically saturated, heavily *'sensorized,'* future battlefield environment without being easily detected and consequently destroyed.

According to Army sources, the M3 version of the Bradley armored fighting vehicle fundamentally lacks the rigorous stealthy characteristics considered mandatory for the FSCS. The High Mobility Multipurpose Wheeled Vehicle, HMMWV (XM1114) up-armored scout version, though with improved mobility, lacks adequate armor protection. The HMMWV is equipped with light weapons and has insufficient payload-carrying capacity for the required wide array of sensors and electronics. The latter are necessary to successfully meet the surveillance and reconnaissance needs of the future battlefield during the first quarter of the next century. Neither the HMMWV nor the Bradley was designed or optimized to perform scout and cavalry missions.

Arguably, scout and cavalry operations have been viewed in the past as secondary in importance to the combined armed forces' maneuvers. Existing infantry carrying platforms, produced to satisfy other land warfare functions, were converted into scout and cavalry vehicles. They were not customarily designed nor optimized to achieve their specific mission. Thus, inherently limiting compromises in firepower (primarily self-defense), survivability (armor protection, signature attenuation, detection sensing ability, etc.); mobility and agility had to be made. This situation has changed dramatically with the proliferation of high-tech weapon systems offered for

sale today in the open market, and the availability of a wide array of matured 'sensing' technologies.

It is widely recognized that an army with superior tactical *situation awareness*, real-time intelligence gathering, fast information dissemination capabilities, and high potential firepower, will have the decisive edge and thus dominate the future battlefield. It will win the war in the shortest time possible, with minimum casualties and with lesser damage to its own military installations and industrial assets. The FSCS is designated by the U.S. Army to be one of the principal means by which it will substantially improve its tactical situation awareness. It will gain the critical, decisive, and competitive edge deemed crucial for quickly winning a modern war. It will play an essential role in the digitized battlefield by analyzing, sending, and receiving vital information that will dramatically enhance combat effectiveness and survival of front line combatant units.

FSCS/TRACER — A Joint Program Between the U.S. and U.K.

The U.S. Army began thinking about a new *Future Scout and Cavalry System* (FSCS) just a few years ago. The Armor Center's Directorate of Force Development at Fort Knox, Ky., has concluded that an FSCS was unequivocally essential for the ground forces to achieve superiority on the battlefield. The FSCS will achieve that with an *unprecedented* level of intelligence gathering, information dominance, real-time analysis, and effective dissemination of information.

The main thrust was launched when the U.S. Army ascertained that its scout and cavalry vehicle program resembled the one that had been launched by the British Army in a program known as TRACER *(Tactical Reconnaissance Armored Combat Equipment Requirement)*, intended to replace the British Army's aging Scorpion family of light armored vehicles. The profound similarity of operational requirements between the FSCS and TRACER is the major rationale behind the U.S. Army initiative. On April 21, 1997, a joint requirement oversight council validated the service's mission need statement for the FSCS. Coupled with seemingly perfect timing (still), it has presented a unique window of opportunity for the U.S. and the U.K. armies to join forces and effectively merge the two individual programs. The agreement would substantially reduce overall Engineering Development Manufacturing (EDM) costs to the U.S. by splitting them with the U.K., and would cut production costs for both nations by leveraging economies of scale.

Consequentially, the U.S. and U.K. zealously embarked upon a collaborative venture to develop and produce a common FSCS/TRACER. On July 7, 1998, they signed a Memorandum of Understanding (MOU) that covers the program definition, production, and follow-on support. The MOU states that the FSCS/TRACER will fill a need for both sides to correct existing shortfalls in the current ground reconnaissance/counterreconnaissance capabilities on the battlefield and to fully implement new emerging military doctrines. Current long-range U.S. acquisition plans call for procurement of 1,700 FSCS systems, to begin fielding in the 2007-2008 time frame, while those of the U.K. call for 400 TRACERs. This combined production quantity is ostensibly sufficient to ensure industry economical return on its investment. The US/FSCS is targeted for fielding to all Army scout platoons, including division and regimental cavalry squadron scout platoons that are equipped with HMMWV/M1114 and M3/Bradley.

In order to facilitate the FSCS joint program, the U.S. Army has approved, for the first time, a *Fast Track Acquisition* (FTA) strategy for its Advanced Technology Demonstration/Project Definition (ATD/PD) cooperative phase. Other pertinent executive management guidelines for immediate implementation are: Use of the Army System Acquisition Review Council (ASARC) for follow-on milestone I/II decisions; approval of ATD/PD criteria at 50% signature reduction and 250% increase in target identification and acquisition range; and the execution of an affordability study to address unit manufacturing costs (UMC) prior to establishing requirements and requesting proposals for the subsequent Engineering and Manufacturing Development (EMD) phase. According to Army officials, the FTA strategy will shorten the development effort by roughly 4 years and save a total of $890 million by combining exploration, project definition, risk mitigation, and EMD phases. A unique U.S. feature of the FSCS program strategy is the elimination altogether of the traditional Demonstration/Validation (DEM/VAL) phase, thus allowing the program office to move straight into the EMD phase following the completion of ATD/PD phase. A formal Request For Proposal (RFP) was issued on July 7, 1998, immediately following the signing of the MOU. Two competing international consortia were to each receive a 42-month contract (scheduled for 12/98) to cover the development and production of an Advanced Technology Demonstrator (ATD). These competing ATDs will be completed at the close of 2001, 36 months after contract award. Thereafter, only one consortium will be down-selected for the EMD phase.

Much has been written about the political nature and inherent mutual benefits of such unprecedented cooperation between the U.S. and the U.K. governments. To keep records straight, the U.K. voluntarily brought its program to a temporary halt, allowing the U.S. to organize and subsequently join forces with the U.K. in this ambitious program. Multinational defense programs of this nature, orchestrated between allied countries on political grounds, are known to be extremely intricate and fragile. They have their 'enemies' (opponents) from within and outside of their respective defense organizations. They also require that the two governments (and armies — at all working levels) be fully committed and work very closely to solve any problem. The participating governments must quickly abridge emerging differences and legal complications that may rise initially (e.g. signing the MOU), during the developmental and production phases. They must ensure program stability and enduring support. Experience has shown that participants must share developmental costs on an equal basis (50/50%) and thereafter, *individually* bear production costs in accordance with the base configuration and quantities each party plans to procure, while enjoying the savings of a combined production order.

Complicated contractual issues had to be resolved before the memorandum of understanding was signed. These included intellectual property rights, in the event that either party decides to prematurely end its participation in the development or prior to production; transfer of technology; cost sharing during the development and production phases; and future international sales to a third party by each participant. Another essential prerequisite is that both armies must be willing to exercise a philosophy of 'give-and-take' in order to establish the widest base possible for common operational requirements. A major threat to the rationale and stability of such a cooperative program could possibly arise if the U.S. versus U.K. unique requirements will govern and dominate over the common, rendering the developmental phase ineffective and subsequent production non-economical. Following the removal of these obstacles, FSCS engineers must yet encounter extraordinary technical challenges. They must achieve the optimum

middle grounds between highly sophisticated technology and escalating costs; reliability and utilization of fully integrated, customized versus 'off-the-shelf' Non-Development Items (NDI) modular systems.

Finally, the independent National Defense Panel (NDP), though not specifically recommending any program cancellations, has recently challenged the validity of the Army's legacy systems, such as the *Crusader* field artillery system and the *Comanche* scout/attack helicopter. This attempt further reemphasizes the vulnerability and fragility of new major weapon systems developments in withstanding the sharp teeth of military downsizing and critical budget cuts. Senators have been known to continuously urge Congress to look seriously at potential weapons cancellations to free funds for other high priority modernization programs that will better position the U.S. Army against modern and future threats. In this 'hostile' political ambience, any major new developmental program could become an inopportune victim of cancellation due to DOD's attempts to recover funds for investment in *revolutionary* technologies and other force-multiplier modernization priorities. Recently, we have been advised of the U.S. Army Armor Center efforts to terminate the M1A2 upgrade in support of the FSCS funding. This is a precarious situation, which may lead to a severe conflict within the service's elements themselves and industry, causing program instability. Furthermore, we have recently ascertained that the U.S. Army is considering an increase in the Crusader requirement from 824 to 1,378 systems, extending production by 5 years. Given overall finite and ever decreasing budgets for acquisition and procurement, this may lead to a shortage of funds available for FSCS future production.

Multinational Defense Joint Ventures — Critical Lessons for the FSCS

In reviewing similar multinational joint ventures, the MBT-70, an ambitious U.S.-German collaborative tank program during the late 1970s, comes to mind. The tank was technically superior to its contemporaries, but way ahead of its time. This collaborative program did not come to fruition because the two governments failed to abridge and conciliate their differing operational requirements and other pertinent funding, intellectual, developmental and production matters. In Europe, multinational attempts to cooperate on various defense programs suffered a similar ill fate. Germany developed the PzH 2000 and Britain the AS90 self-propelled howitzers after the multinational effort of Germany, Italy and the U.K. to develop the SP70 howitzer failed in the mid-1980s. The Howitzer Improvement Program (HIP/M109) during the late 1980s, which evolved into a joint venture between the U.S. Army and the Israeli Defense Forces (IDF), exemplifies the complexities of such endeavors. This program commenced with an extensive base of common requirements that served as a firm foundation and justification for such a joint venture. Unfortunately, as the program progressed, conflicting operational requirements, cost and domestic industrial issues had emerged, leading to an ever-growing increase in individual unique requirements while diminishing the common. Consequently, the joint program was ultimately terminated, and each country proceeded with its own efforts, culminating with their particular designs (The U.S. with the M109A6/PALADIN).

This brief, grim history of similar unsuccessful international endeavors is not intended to discourage, predict, or cast a shadow on the current collaboration. It does emphasize the *crucial* importance of true and full cooperation among political, military-operational, industrial functions, and other DOD procurement and acquisition entities deemed mandatory for program success.

In the authors' opinion, if the above critical lessons will be carefully analyzed and correctly implemented, the FSCS program is predestined for success. It possesses a unique blend of essential ingredients and prerequisites. Its timing is favorable; up-front funding for Project Definition and Advanced Technology Demonstration (PD/ATD) is available and supposedly in place; operational requirements are recognized, well established, and justified; sensor technology is maturing and available; and the FSCS could be successfully put to use in local or in large scale military conflicts. Last but not least, the cooperation between the U.S. and the U.K. governments could serve as a mutual 'insurance policy' for both armies, diminishing the likelihood of a premature political termination, avoiding the destiny of similar ill-fated defense programs. The FSCS philosophy complies with the U.S. Army's fresh line of thought in accomplishing a *"Full Spectrum Dominance"* in the near future. It embodies seeking *"Mental Agility"* by enhancing real-time information processing and situation awareness, in contrast to *"Physical Agility,"* which pertains to all other progressive conventional improvements and upgrades. The FSCS could successfully be deployed with a small strike force that will be more lethal and mobile than current units.

The FSCS — A Leader at the Forefront of Current Advanced Technology

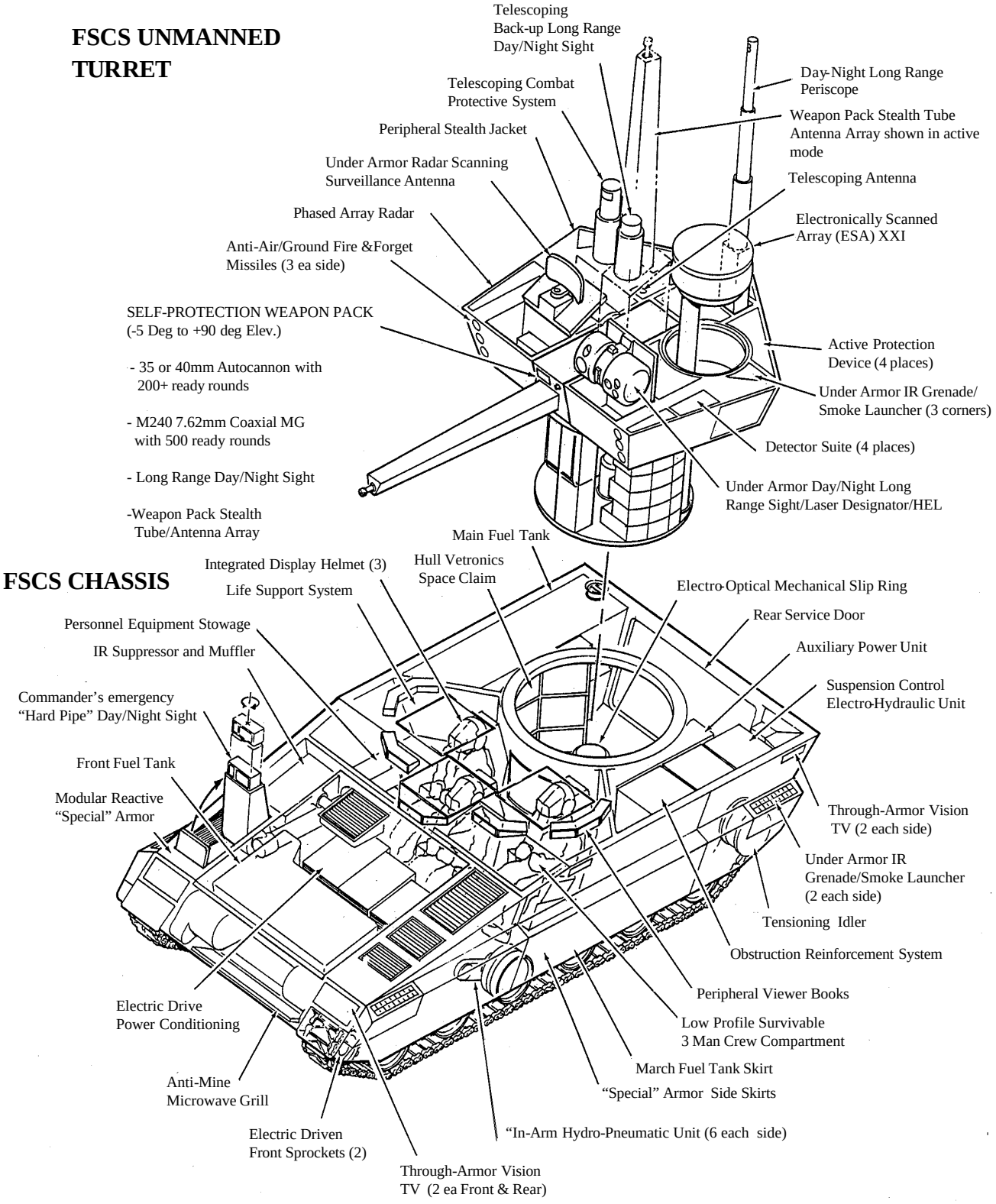
The FSCS is expected to serve well into the 21st century (2030) and will inarguably be the most advanced scout and cavalry customized armored vehicle ever produced. Most of the major operational requirements for such a vehicle seem to be forcefully endorsed by both armies. Positioned at the current forefront of technology, the FSCS will play a prominent role by serving as an *Advanced Technology Demonstrator (ATD)*. An advanced electronic sensors 'suite,' stealth, reduced crew, high-mobility, medium caliber armament, light weight, and enhanced survivability, will all point the way — technology wise — for other potentially subsequent developments, like the Future Infantry Vehicle (FIV) and further along, the Future Combat System (FCS). With the cancellation of the Crusader's Regenerative Liquid Propellant (RLP) main weapon system option, and with ever-growing reliance on *current* technology, the new field artillery system is not largely an ATD.

The FSCS will attempt to leverage numerous next-generation technology programs developed in the U.S., to include: The hunter sensor suite ATD; the multifunction staring suite ATD; the battlespace command and control ATD; the electric vehicle demonstrator; the driver's vision enhancer; the composite armor vehicle ATD; the advanced light armor technology; and the composite armored vehicle (CAV) ATD.

Overview of the FSCS Major Operational Requirements and Technology Feasibility Assessment

The following are the major Combat Operational Requirements that have been presented to the FSCS developers. These are fundamentally different than the requirements posed to conventional contemporary surveillance and reconnaissance vehicles. The profound difference is the *level* of sophistication and maturity of advanced sensing 'suites' and stealth technologies that will ensure successful implementation in the FSCS. The FSCS is required to 'push the envelope' of a wide spectrum of currently developed technologies. With its advanced sensor package; target identification, acquisition and designation capabilities; and long-range optics, it will provide real-time intelligence and enhanced situation awareness. These will be provided at an *unprecedented* level of speed, resolution, detail, and accuracy.

Future Scout and Cavalry System – The Authors' Concept

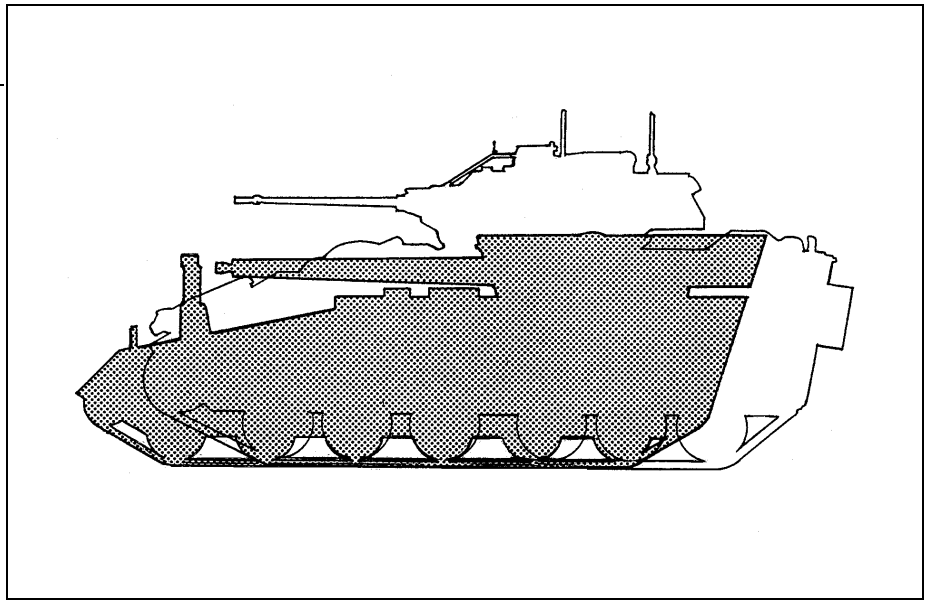


To ensure that the FSCS will survive to achieve its entire mission and ultimately return safely, it must be equipped with state-of-the-art *defensive* protection and weapon systems. These will dramatically enhance its survivability and provide independence from reliance on the forces it is designated to support, allowing it to independently operate close to enemy front lines.

(Ed. Note: Program officials in both the U.S. and the U.K. emphasize that this cooperative program is firmly grounded on operational requirements that are nearly identical for both armies).

• **Situation Awareness Sensors 'Suite'**: Situation awareness is the *paramount* role of the FSCS. It will possess multi-spectral band sensors at ground level and elevated positions (stationary surveillance and on-the-move viewing/monitoring) to detect and identify enemy forces at 10+ km with "Over-The-Hill" (OTH) operational capability in all weather conditions and during day/night. Rapidly advancing sensor technologies currently offer a multitude of detection and monitoring options, such as electro-optical, millimeter wave radar, acoustical, electromagnetic, and infrared. The FSCS will provide answers to the operational strategic level and lower echelon commanders who have ever-increasing information requirements.

• **Multi-Spectral Target Acquisition**: Day/night target acquisition, identification, prioritization and designation enhanced capabilities. The FSCS will be equipped with a new generation radar system, such as Northrop Grumman's *Electronically Scanned Array* (ESA) XXI. This radar is deemed highly effective in supporting FSCS's critical missions. The ESA XXI is based on the Longbow radar mounted atop the main rotor assembly of Boeing's AH-64 improved Apache attack helicopter. This radar combines the basic Longbow fire control system — which detects, classifies, prioritizes, and presents ground targets for the Apache crew — but in a lightweight configuration adapted to ground applications. The ESA XXI ground version uses a smaller, lower cost, and lighter weight antenna that was developed for use by the U.S. Army's next-generation reconnaissance helicopter, the Boeing/Sikorsky RAH-66 Comanche. The direct 'sensor-to-shooter' linkage will be enhanced by combining external information and intelligence gathering from other mobile sources so that the FSCS can integrate his own sensors with external information and intelligence to yield a complete 'picture' of the battlefield.

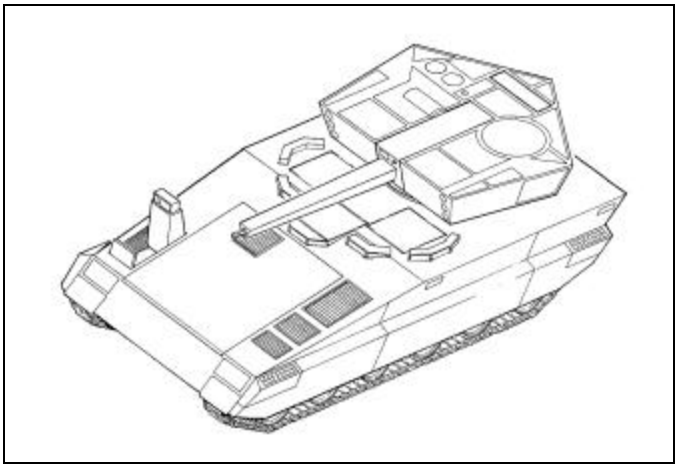


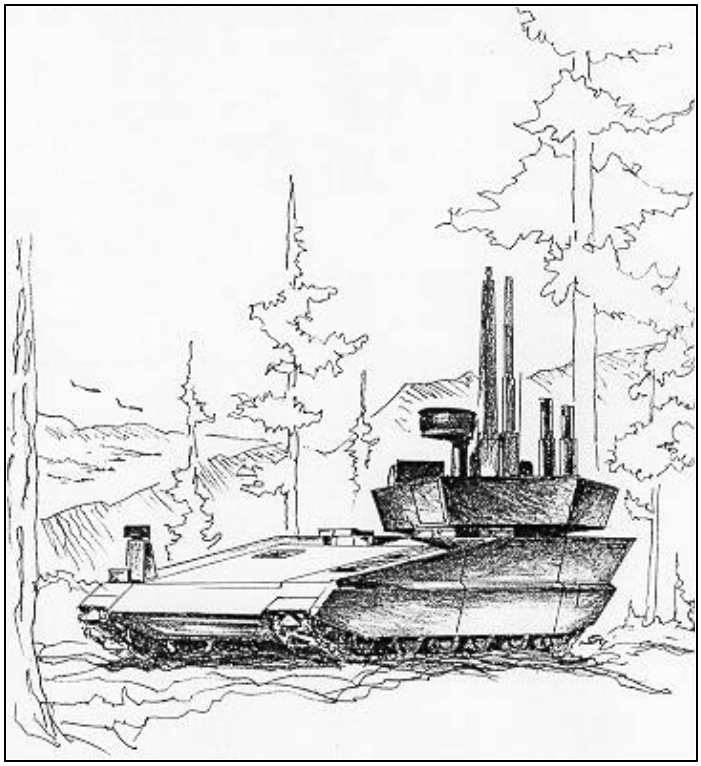
Silhouettes show relative sizes of the conceptual FSCS and the Bradley.

• **Main Defensive Armament:** Equipped with a medium caliber, automatic gun system (30-40mm), sufficient to defeat enemy APCs and lightly armored scout and cavalry vehicles. As connoted, the automatic gun will be used primarily in a *passive* self-defense role, and only as a last resort, when discovered and directly threatened by hostile enemy forces. The main armament will be employed against fixed-wing ground support aircraft, attack helicopters, tactical unmanned aerial vehicles (UAV), and a plethora of ground armored threats. The new Bushmaster III 35mm automatic gun is selected as a possible candidate because of its inherent advantageous characteristics: It is designed and made in the USA, near the end of development, and fires NATO standard 35mm ammunition. The Bushmaster III demonstrates high reliability, superior durability, exceptional accuracy, and safe operation under all firing conditions. This gun is an evolutionary upscaled design that incorporates all the battle-proven features of the 25mm M242 Bushmaster gun, with significant system commonality and low-risk, proven performance. The M242 is a widely acclaimed gun and serves as the primary armament on the Army's Bradley fighting vehicle. The Bushmaster III will be able to defeat the armored reconnaissance threat out into the year 2020 and beyond.

The Bushmaster III combines the cost-effectiveness and compactness of Chain Gun technology, design simplicity, external operation, positive round control, ease of maintenance, and constant velocity feed to enhance the reliability of the gun feed system. Fired cases are ejected forward so that handling and discarding spent cases is entirely eliminated. Longer dwelling after firing reduces gun gas buildup under armor. It is smaller and lighter, and is comprised of fewer parts than any other comparable 35mm gun available today. Bushmaster III capitalizes on the use of externally powered operation to separate gun mechanism motion from cartridge ballistics, allowing for a precisely timed and fully controllable operating cycle. A key feature assuring outstanding reliability is 100 percent positive cartridge control from the time the ammunition enters the feeder until the fired case is ejected from the weapon.

It is readily adaptable to advanced, high performance, anti-armor and anti-air penetrating rounds currently being developed for the popular 35mm ammunition series to defeat present and future threats. The 35mm ammunition family is extensively used all over the world (30 countries) in various anti-armor and anti-air applications, so continuous development and performance enhancement are expected for many years to come. NATO standard 35mm ammunition is characterized by a very short time of flight, which ensures very flat trajectory and enhanced accuracy, resulting in high hit probability and extreme on-target effects. It has excellent armor piercing performance by use of a discarding sabot projectile and superior terminal ballistics. Storage, transportation, handling, and firing criteria are all in full compliance with the U.S. Army and NATO specifications. If Bushmaster III is ultimately selected, 35mm NATO ammunition will be produced under license in the U.S. The Bushmaster III could also operate with the newly developed Oerlikon Contraves





Conceptual vehicle is seen above in travel mode, and at right in surveillance mode with sensor systems deployed. Main gun tube housing also contains antenna array and is raised to vertical when sensors are deployed.

Advanced Hit Efficiency And Destruction (AHEAD) anti-air/missile defense to keep abreast of the ever-escalating threat scenario. Last but not least, the Bushmaster III is capable of firing the 50mm *Supershot* ammunition, currently in development, which is substantially more potent than the 35mm standard ammunition. This is a strong argument in favor of this gun, indicating growth potential beyond the 35mm ammunition capacity.

There are possibly other viable candidates for the main armament, but in the interest of space, they will not be discussed herein. Any selected gun must exhibit similar characteristics to the Bushmaster III, or better. (Ed. Note: for discussions pertaining to gun selection, see *ARMOR* article "Forward Area Air-Ground Defense," Jul-Aug 96).

Bushmaster III major Specifications: Caliber: 35mm; Feed: single/dual; Peak recoil: 14,000 lb/ft; Total weight: 535 lb; Overall length: 158.1 inch; Rate of fire: Semi-automatic, 200 rpm (250 max.); Power required 3 Hp @ 28 Vdc; Clearing method (cook-off safe): Open bolt; Safety: Absolute hangfire protection; Case Ejection: forward.

- **Secondary Potential Armament System: High Energy Direct Projection Laser Gun for Self-Defense and Target Designation:** The FSCS will be equipped with a high-power, extremely accurate, fully stabilized laser gun. The FSCS is envisioned as an almost 'all-electric' vehicle, which facilitates use of a laser gun that could be used *defensively* against a variety of close-in threats. Among them are helicopters, drones, ground 'soft' targets, infantry, and incoming enemy missiles. High-power laser technology for armament applications has successfully advanced beyond its infancy and now well established in outer space and airborne applications. The FSCS laser gun application will probably be a near-term 'spin-off' of these developmental efforts. Incontestably, laser gun technology represents a tremendous step towards independence from logistic support. There is no need for frequent ammunition resupply since it will be 'firing' variable, high-energy short pulses (bursts) of converted electrical energy. During target acquisition, a low-energy laser beam will be pointed at the target to verify 'on-target' position and the corresponding effective range. Subsequently, the low-energy beam will be substituted with a short, high-energy pulse, ultimately yielding target destruction (see *ARMOR* articles about the *Future Combat System* – FCS, J-A 97, S-O 97, and J-F 98).

Though chemical laser technology is considered mature, a compact and transportable tactical laser weapon system, well integrated into a smaller mobile armored vehicle such as the FSCS, remains to be demonstrated. Typical outstanding issues are integration of optics, energy pressurization system, radar, and command and control. Recent developments in high-power laser technology imply that future 'spin-off' Self Defense Initiative (SDI) exertions, on a much smaller scale, could be implemented in armored ground-to-ground and ground-to-air offensive weapons and active self-defense applications. A high-power, direct Line of Sight (LOS) laser beam must have the ability to travel through the atmosphere at tactical operational ranges (10-15 km) without detrimental losses from beam spreading, divergence, dispersion, diffraction, and scattering. Additionally, it must maintain its 'self-focus' characteristics and high-energy density, which are mandatory for achieving an effective target kill, severely damaging or temporarily disabling an enemy threat.

- **Battle Management System (BMS)** The second generation Battle Management System (BMS) includes peripheral multisensor-aided Target and Fire control acquisition system, a day/night integrated system capable of automatically monitoring and tracking up to 8-10 active or passive targets simultaneously and autonomously. Automatic air/ground acquisition would come through thermal imagery, millimeter-wave radar processing, and direct optical sights. The system would include: target recognition, identification, prioritization, and automatic tracking with fire controls for both main (medium automatic gun) and secondary (laser) armament incorporating full stabilization and automatic loading. It would include fire-on-the-move capability while engaging multiple targets in self-defense. It would play a passive role within the tactical and regional digitized communication networks by providing critical battle awareness information and target data submission and acceptance. The FSCS/BMS could be temporarily 'slaved' to other FSCSs, air defense systems, or to higher echelon command and control centers.

- **Signature Management**: A Reduced Signature Management System (RSMS -

radar, acoustic, visual, infrared/thermal and magnetic) would enhance survivability.

- **Multi-Net Communications**: Capable of simultaneous voice, data, and imagery communications on multiple nets, and of collecting, sending, receiving, and integrating information from a variety of land, air and sea sources, including higher echelons, other services, and friendly forces. Intervehicular communications must be highly reliable and capable of operating flawlessly and continuously under all adverse conditions to facilitate internal communications and dissemination of information within the crew.

- **Mobility**: Must be greater than the supported armored forces, with potential speed of 60 mph. An amphibious capability is desired. The FSCS will be powered either by a conventional power pack, comprised of a highly efficient diesel engine coupled with a hydro-kinetic transmission, or a hybrid electro-mechanical power system (discussed separately).

- **Survivability**: Increased survivability against enemy scout vehicles via signature management reduction, enhanced agility and mobility, a "dynamic protection 'suite,' selective modular special armor, and NBC integrated protection.

- **Deployability and Force Projection**: Transportable by C-5, C-17, C-130, and C-141 aircraft.

- **Endurance**: Effective range of 400 miles, 72 hours continuous operation without resupply.

- **Hull/Turret Construction**: Advanced composites and metallic materials implemented as structural and ballistic elements to facilitate weight reduction and reduce radar and thermal signatures. Though not mandatory and a topic for a separate discussion, it is most likely that the FSCS will be equipped with a weapons/sensors station, which will resemble a rotating platform or superstructure. It will provide structural support for the main and secondary armaments, as well as for the vast array of multi-directional sensors, other electronics, and communications equipment. The conventional turret is not applicable here because that implies at least one crewman will be positioned there. In the authors' personal opinions, the multitude of electronic sensing and communications equipment, in addition to the main and secondary armaments, will not leave any extra room for an additional crewmember. If attempted, it will result in an undesirable increase of the FSCS's weight due to the need for additional ballistic protection, and consequently, the enlargement of its visible silhouette.

- **Modular Armor Protection:** The FSCS will be equipped with an advanced add-on modular armor kit ('package') that will be installed as required. This armor kit could be improved over time without requiring major changes to the hull and weapons/sensors station. It will also allow easier transportation of the vehicle without the armor kit, which could be transported separately. This system will protect against medium-caliber ammunition and rocket-propelled grenades.

Two or Three Men Operational Crew - Is It Feasible?

The vehicle would be manned by a crew of two, preferably three, to facilitate simultaneous mounted and dismounted surveillance operations. The option to carry a fourth crewman in the turret to extend the length of effective operational capability — though up front seems advantageous — will substantially reduce the electronic 'payload,' ultimately resembling the undesirable image of yet another personnel carrier. The FSCS must be smaller and lighter than the Bradley. Its crew ought to be less than the conventional four or more crewmembers in order to reduce the vehicle's protected and visible volume. Full automation, with consolidation and centralization of major functions performed by a conventional crew, will eventually lead to dramatic crew reduction. The major functions of commander, main armament operator, weapons/self-defense suite operator, data acquisition and processing operator, and driver/navigator, could be alternately assumed by each one of only three crewmembers. The adaptation of a reduced crew requires a departure from the underlined philosophy of conventional APC operation. The three-crew members could not and should not be expected to perform all routine functions presently assigned to conventional APC crews. It implies that logistics, maintenance operations, sentry duties and alike, should be *reduced* by virtue of highly advanced technologies and extended reliability. The FSCS self-defense systems should operate intelligently and independently; continuously watching, monitoring, and protecting while the crew is asleep, recuperating, or inoperable.

Alternative Energy Propulsion for Automotive Applications

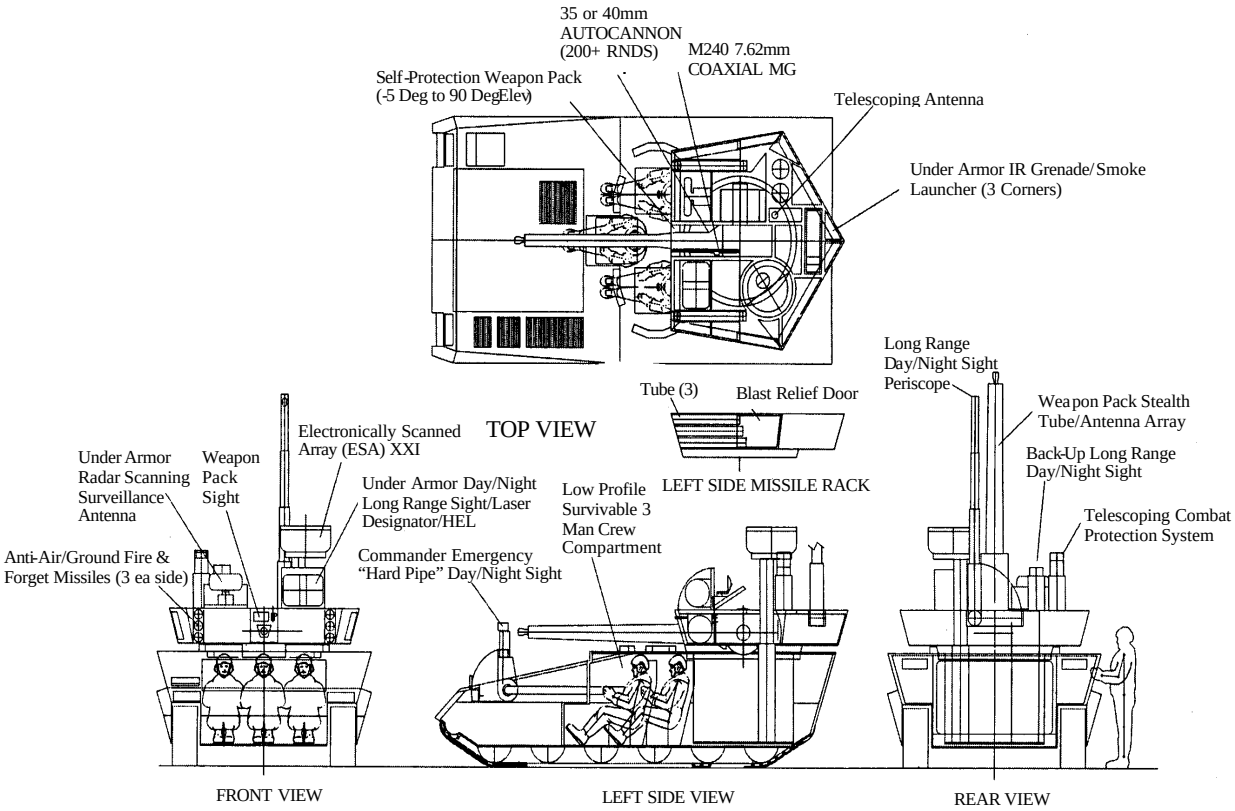
A predominant FSCS requirement is to significantly lessen the dependency on conventional fossil fuels, thus making the FSCS more independent and capable of operating over long periods without requiring periodic maintenance and logistical support. This requirement is difficult to satisfy and necessitates a departure from any conventional power source. As shown, the FSCS power pack is configured for a hybrid front-drive installation. Electro-mechanical propulsion for mobility applications is currently recognized as the wave of the future, let alone the fact that another major system is partially utilizing electrical energy for its operation.

- **Hybrid Electro-Mechanical Power System For Automotive Applications**

Defense Daily (12/11/96 p. 398) reported that DARPA is embarking upon a new venture to find a contractor team able to inexpensively develop and demonstrate the capabilities of a highly-effective, Hybrid Electro-Mechanical Power System (HEMPS) for generation and storage of electricity. HEMPS is intended for automotive applications as a prime-mover in advanced combat vehicles. In essence, it is comprised of a diesel engine or gas turbine driving a generator(s) to produce electrical energy for use and subsequent storage by the vehicle systems. DARPA intends to invest more than $40 M to develop and test the HEMPS over the coming few years. Competing teams will develop and demonstrate an integrated HEMPS for a 15-20 ton vehicle (e.g., FSCS).

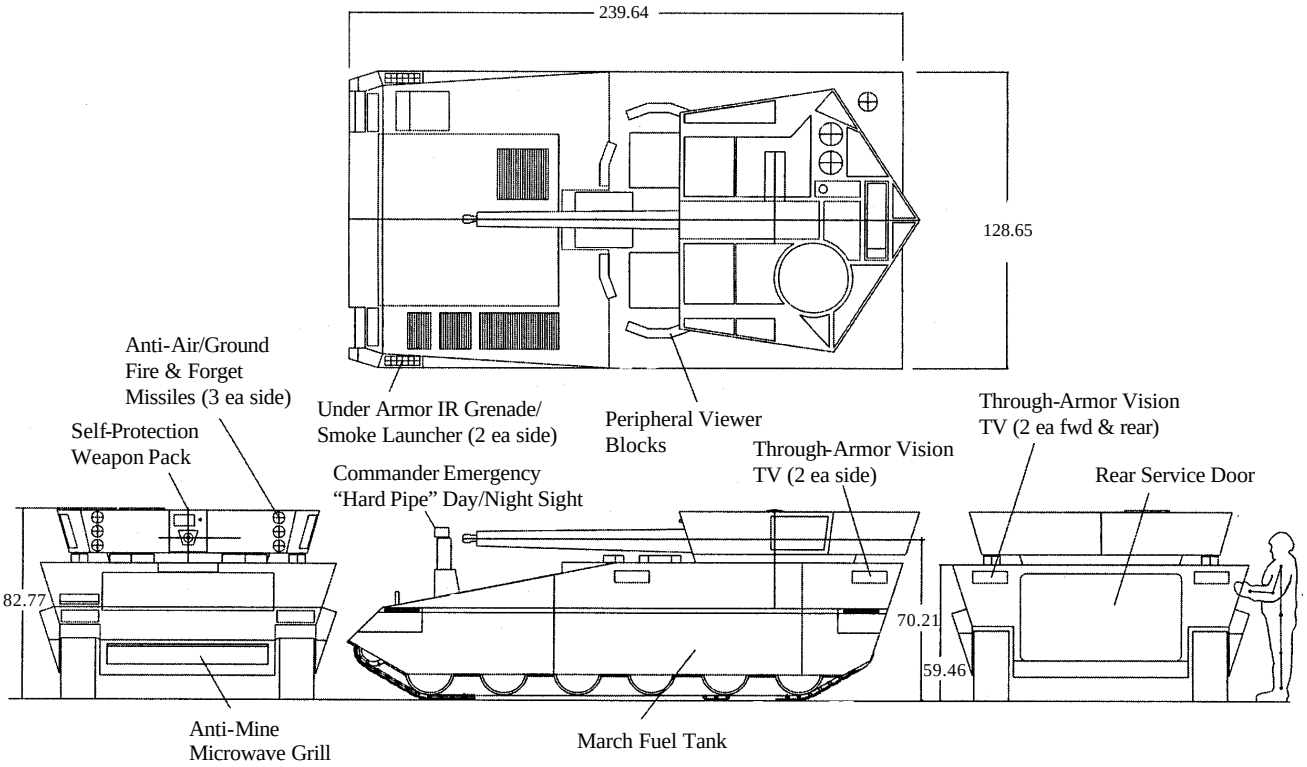
Granting industry the prerogative to develop its own designs without stringent directive from DARPA is a fine idea that has great merit and will pay handsome dividends in shorter schedules and overall reduced developmental costs. The HEMPS is in full accordance with the requirement for simplified and reduced logistics. Integrated HEMPS are more efficient and have improved performance compared to contemporary diesels or turbine-based power packs. They operate with less noise and with reduced thermal signature, thus improving survivability. It's problematical whether integrated HEMPS will be less costly to produce and deploy than contemporary diesel power packs. Attempting to capture the better of two worlds, HEMPS seems to be applicable to the lighter FSCS and alike as a near-term solution, and less for the longer-term, heavier FCS. HEMPS is still going to require diesel or turbine fuel for its operation, and now we would have a piston engine or a gas turbine in addition to a sophisticated electrical power generating system to worry about. This will be counterbalanced by higher reliability and fuel economy.

FSCS Concept Vehicle Details



FCS Concept Vehicle (Overall View)

(Sensing Devices Under Armor)



- **Circumferential Transparent "Virtual Reality" Under Armor Vision**

All-around, 'virtual reality' day/night 360° array of TV/Thermal cameras and computer processed vision enable the crew to "see" through the armored walls of the crew compartment with their helmet-integrated displays. It allows excellent "buttoned-up" visibility and alleviates motion sickness. The weapons could be fully slaved to each of the three-crew members as tactical considerations and battle conditions dictate. All critical battle awareness, vehicle status, and intelligence information is accessible to the crew on their helmet displays.

Integrated Survivability

- Lightweight (15-20 ton) all-terrain, all weather, extended-operational capability, highly mobile vehicle. More versatile than the present Bradley APC series and capable of missions *beyond* those traditionally performed by contemporary surveillance and reconnaissance scout and cavalry vehicles.

- Substantially reduced overall target signature (heat, acoustic, magnetic, and visual) via 'stealthy' materials and a contour design. Equipped with an extensive Signature Management System (SMS - thermal, electromagnetic, acoustic), countermeasures, and a *False Target Generation* (FTG) active/passive decoy system which could project and emulate an imaginary FCS signature to divert incoming homing missiles.

- Equipped with a self-defense dynamic 'Hit-Avoidance Suite' (HAS) which automatically detects, prioritizes, counters, and intercepts enemy cruise missiles, helicopters, unmanned vehicles, high performance fixed wing ground support aircraft, top attack anti-tank munitions, artillery munitions (SADARM - Search and Destroy - Armor type), and other anti-tank threats.

- Automatic detection, alert, avoidance, and protection in areas contaminated by Weapons of Mass Destruction (WMD), and Nuclear-Biological-Chemical (NBC) protection capability.

- Integrated passive/active mine detection, avoidance while stationary or, preferably, on the move.

Force-Projection Deployability

- Improved air, land, and sea transportability and deployability by way of reduced overall weight/volume and a smaller silhouette.

- Play an essential role as an *active* information node, fully integrated into the digitized communication battlefield, tactical, and regional networks: combat, surveillance and logistic.

- Improved cross-country mobility, speed, and agility, and greater range than the Bradley APC.

- Autonomous day/night obstacle avoidance, 'Auto-Pilot' (AP) navigation/cruise and automatic formation maneuvers.

Enhanced Mobility

The FCS will be equipped with a highly efficient, electro-mechanical power train, which consumes substantially less energy than conventional prime movers to produce equivalent output. It could increase the operating range by up to 20% and more when compared to the fuel guzzling gas turbine engine. It has a much higher power density (HP/ft^3) and is much smaller in comparison to conventional diesel or gas turbine prime movers (up to 50% increased volumetric efficiency). Power electronics could be increased by 100%, which ultimately implies a smaller envelope of the FSCS. A composite 'band' track will reduce noise signature (30-50%) and increase life such that no maintenance is required during operational activity.

- *Unprecedented* cross-country mobility and enhanced agility will be provided by a Hybrid Electro-Mechanical Power System producing variable 600-700 Hp (@20 ton, 30-35 hp/ton). Computerized hydropneumatic 'dynamic' suspension will provide a smooth and comfortable adjustable ride over all kinds of rough terrain. Maximum cross-country speed will be 100 kph (63 mph). This is high and practically unattainable with limited performance, conventional torsion bar or coil-spring suspensions. Nonetheless, it is attainable with a hydropneumatic suspension. Maximum flat-road cruising speed will exceed 120 kph (75 mph) at maximum power output.

Sustainability — Reduced Maintenance and Logistics

- Powered by a new, highly efficient type of prime mover. An engine/power source that facilitates the implementation of electricity as a source of energy.

- Significantly reduced reliance on conventional maintenance, resupply of rations, ammunition, fuel, and spare parts to achieve extended operational capability.

Logistics Are Crucial To the FSCS

Like all contemporary modern APCs, the Bradley requires a long, vulnerable 'trail' of logistic support, which severely limits its deployability and operability. In the power projection era, strong logistical dependency is not acceptable. The current goal is to reduce the logistic burden by at least 50%! A modern, maneuvering army must reduce its reliance on restrictive logistic support systems while consuming fewer, limited resources. On July 17, 1996, Maj. Gen. Robert Scales, Deputy Chief of Staff for Doctrine at the Army's Training and Doctrine Command (TRADOC), expressed his conception that the Army's operational revolution relies upon effective utilization of better technologies and techniques to support ground forces. The key issue is to *"temporarily break from the logistics umbilical cord..."* restoring the rapid maneuvering of dispersed formations so essential to full exploitation of armor's firepower, shock, and mobility. According to Gen. Scales, the Army will be able to create a dominant Force XXI by employing alternative sources of energy for mobility and propulsion while reducing the traditional restricting dependency on rations, ammunition, and spare parts. This same underlying philosophy has played a paramount role in the derivation of our FSCS concept.

Tracked Versus Wheeled Suspension

Tracked suspension is by far the best system ever devised for ground automotive applications in terms of mobility, reliability, and durability. There is no evidence of any current or near future system that could match or outperform it. There are some voices arguing to equip the FSCS with a conventional wheeled system. No wheeled vehicle could catch up with armored formations when they move quickly to surprise and defeat the enemy. Tracked suspension will remain the best and only choice for armored vehicles on the Earth's random surface texture. Future improvements will include extended durability, maintenance-free operation, and substantial weight reduction. The FSCS will be equipped with a Hydropneumatic Active Suspension (HAS). HAS is a hydropneumatic tracked system that provides a high degree of tactical mobility through variable suspension height, which is dynamically computer controlled, and allows operation over all terrain types and in all weather

Continued on Page 49

An early Bradley maneuvers at the National Training Center.

Chariots of Fire:

Building the Bradley Fighting Vehicle

by Major General Stan R. Sheridan (Ret.)

Chariots of Fire may be the title of a 1981 Oscar-winning Hollywood movie, but it is also a fitting description of the "soldier-carrying" vehicles that went into production in 1981 and today carry the Bradley Systems name. In fact, chariots of one kind or another have carried soldiers into battle, and on and around the battlefield, throughout the recorded history of warfare, dating as far back as the early Egyptians and the Romans. Even today, the Israeli indigenous tank carries the name chariot in Hebrew — Merkava. So, some 20 years after departing the program as the U.S. Army's first Program Manager for what has become known to the world as the Bradley Fighting Vehicle System, and some 6,724 Bradleys built and in the hands of U.S. Army soldiers, it seems appropriate for me to tell the story of how the Bradley evolved into the finest fighting Chariot of Fire of its type in the world today.

The history of the Bradley was long and tortured. While today we take the design and the vehicle's outstanding warfighting performance for granted — its two-man turret, the two TOW antitank missile launcher, the highly effective 25mm cannon system, the very reliable power train with its outstanding cross-country mobility, and the overall fightability of the system — this was not always so. In the beginning, in the late 1960s and early 1970s, the Army was struggling to determine and define just what it wanted as the replacement for the M113 armored personnel carrier (APC). The M113 had been a workhorse during the Vietnam War and was the backbone of the Army's mechanized infantry. Was the replacement to be another APC that brought fighting men to the battle in a protected "battlefield taxi" and then placed them in harm's way to fight on foot; or was it to be a true fighting vehicle, giving the soldier a protected place from which to assault, fight, and kill the enemy? The result, in the early 1970s, was the latter, a fighting vehicle concept called the Mechanized Infantry Combat Vehicle, or MICV, which, when translated to an all-up prototype in the mid-1970s, proved to be unfightable. The gunner was in a one-man turret; the vehicle commander was in the hull behind the driver where he could not see to command or fight the vehicle; the crew/squad compartment was a crowded "arms room" and an inadequate fighting platform; and the main armament, a 20mm cannon, had no armor-killing capability.

In 1975, the MICV program was reoriented and combined with the Army's SCOUT and Bushmaster (25mm cannon) programs into a single vehicle program, the Infantry and Cavalry Fighting Vehicle System, renamed in 1981 for General of the Army Omar N. Bradley. With that reorientation came a reaffirmation of the Army's requirement and a redesign that resulted in today's Bradley Fighting Vehicle. Its two-man turret placed the vehicle commander up high where he could see, command, and fight the vehicle. The addition of a two TOW antitank missile launcher gave the mechanized infantry battalion a long-range, front-line, tank killing capability without increasing the Army's force structure. The vehicle's crew compartment stowage was revised and redesigned into a fighting compart-

ment from which mounted infantrymen could fight. And the less-than-capable 20mm cannon was replaced with the battlefield-worthy 25mm Bushmaster, with its armor piercing and high explosive multipurpose ammunition. With this redesign and reorientation, the technical design challenge for the developer of the new vehicle was on a par with that of designing a tank, but with the added human factors of carrying an infantry squad, allowing the vehicle to swim, and ultimately making it an acceptable fighting platform for mounted infantrymen and cavalrymen.

With these changes, the mechanized infantry found itself in much the same position, from a doctrine standpoint, as the horse-mounted cavalry did when the machine gun first appeared on the battlefield. The design of the new mobile weapons system, when translated into fightable hardware, required changes in mounted infantry doctrine and the development of new operational concepts and tactics in order to take full advantage of the new vehicle's battlefield capabilities. Firing on moving targets with the 25mm cannon, for example, now required the infantry gunner to use tank gunnery techniques, which were totally foreign to the infantrymen of the late 1970s and early 1980s, whose largest automatic weapon until then had been a .50 caliber machine gun. As a result of this and other operational capabilities and requirements of the new system, mounted Bradley infantrymen required totally new training packages.

To the Army's credit, it bridged the doctrine, training, and tactics gaps, and has produced the world's most capable and finest mounted warriors.

The Bradley development program proceeded successfully through the late 1970s and early 1980s, sucessfully fighting off the "Too Big, Too Bulky, Too High" naysayers, a presidential program cancellation, and three U.S. Army general officer reviews, in 1976, '77, and '78. With the program re-started after the presidential cancellation in 1977, and the reaffirmation of the requirement, the concept, and the design by the three general officer reviews, the program proceeded to meet its congressionally mandated first production delivery date of May 1981 without further delays. In fact, the Bradley was the first, and I believe the only, tracked vehicle to be approved for production by the Army and the Office of the Secretary of Defense (OSD) on the first request. This was due primarily to the vehicle exceeding its overall designed-in system Reliability-Availability-Maintainability requirements during independent government acceptance testing.

But there is more to the Bradley story. The real questions facing the fielded Bradley system were: What do soldiers think of the vehicle? Is it really fightable? Does it meet the Army's needs? And how does it do in combat? The proof of any piece of equipment issued to soldiers is its performance and soldier acceptance in combat, and the Bradley was no exception. The Bradley's combat test and proof was Desert Storm, where it received not only its baptism of fire, but complete soldier acceptance. The experience of the lead brigade of the 24th Mechanized Infantry Division's "Left Hook" operation was typical of the Bradley's superb combat performance in the 100 hours of Desert Storm. The brigade's 120 Bradleys traveled 360 miles, fighting all of the way with no vehicle drop-outs or losses. While the 25mm armor-piercing round did kill some T-72 tanks with shots to the side and rear, it proved to be an overkill against the Iraqi BMP infantry carriers, often passing right through the BMP and calling for use of the more appropriate HEAT-MP (High Explosive Antitank-Multi Purpose) round. The Bradley soldiers of Desert Storm, and those using the vehicle in places like Somalia and Bosnia, have resoundingly endorsed the system and put to bed the naysayers, the questioners, and the critics by affirming that the Bradley is a highly mobile and effective battlefield killing machine. It is not an APC nor a battlefield taxi, but it does take soldiers to the battle and lets them fight while mounted and protected. It is not a boat, but it does have a swimming capability. It is not a tank, nor is it heavily armored, but it does have a long-range tank killing capability; and it exceeds the tank's cross-country mobility and effectively complements the tank on the battlefield. Today, with over 6,700 infantry and cavalry fighting vehicles in the hands of U.S. Army soldiers around the world, the Bradley is justly touted and soldier accepted as the finest fighting vehicle of its kind in the world.

Having said all of this, and having painted the fielded Bradley infantry and cavalry system in justifiable glowing praise, I do not want this article to look like a "whitewash" of the program, which at this point, some readers might say it is. I say this in view of the recent HBO movie about the Bradley, which said just the opposite, described the vehicle and the program as a flaming disaster, and depicted me and my two successor general officer program managers (Phil Bolté and Don Whalen) as a composite evil incarnate. Certainly, in all honesty, the program did have its problems along the way, both fiscal and technical, but no more so than are to be expected in any combat vehicle development program, and certainly less than some of its predecessor programs. These are examples of some of the problems that we really did encounter:

- From a fiscal standpoint, we all — government and contractors alike — grossly underestimated the impact of inflation and the cost of doing business in the 1970s and early 1980s, which drove up the system's final unit production cost.

- Technically, the early transmission was a show stopper. The problems caused me to stop government testing in late 1975 and introduce into the program a full transmission competition between two different technical approaches. The current fielded transmission is the result of that competition, and I might add is the "fixed" and winning version of the original MICV show stopper.

- The gun, too, had its development problems. One evening, I received a call from one of the two competing 25mm cannon developers asking which news I wanted first, the good or the bad? The good news answer I asked for first was that the explosion had put out the fire; the bad news was that the cannon had blown up in a test stand. Again, this development problem was fixed prior to weapon selection and acceptance by the Army.

- As I said earlier, the Bradley is not a boat, but it does swim today. While trying to make it work, we sank some (without casualties) during the development of the final swim kit.

- Long after I had left the program, and the Army and OSD had given the production go-ahead, there was a "tempest in a teapot" over the ballistic protection of the vehicle's aluminum armor, the lack of Army live-fire verification tests of the Bradley's armor in a complete, all-up vehicle, and a claim by some at the Office of the Secretary of Defense that aluminum armor would burn catastrophically when hit. All of this was emphasized in the HBO movie. Protection levels for the vehicle are still classified today, but in general, standards called for protection at various ranges against direct fire weapons up to 14.5mm, small antitank shaped charge missiles, various size mines, and overhead artillery bursts nearby. Although the movie doesn't give this impression, we also knew from the beginning that, if the vehicle was hit by large mines, large antitank missiles, or

tank rounds of any size, there would be major penetrations and serious damage. These risks, as a trade-off between mobility, protection, and weight, were accepted by the Army from program inception and were reconfirmed by the three general officer reviews of the late 1970s. As a result, ballistic testing was limited to firings on representative armor arrays and technical calculations based on previous ballistic test results, and not on an all-up, very expensive vehicle, testing it to destruction. Initially, the Army and OSD were satisfied with these results, but later, due to the persistence of testers in OSD, the Army conducted full vehicle live-fire testing to destruction. Seventeen production Bradleys, a mech infantry company's worth, were taken from the Army and used in these tests, which OSD directed and paid for. Of those 17, four were tested to destruction, and the remaining 13 were used for various other live-fire tests, but all were lost to the Army's inventory. When it was all said and done, the testing reconfirmed what we already knew to be the protection levels of the vehicle, what would happen to the vehicle if hit by large missiles, tank rounds, or large mines, as well as the fact that aluminum armor does not burn catastrophically as claimed by the OSD testers.

An interesting aside to the live-fire story was the use of a MICV prototype (the vehicle is now displayed as a monument in front of Infantry Hall at Fort Benning) for early mine testing. Initially our program master plan called for 12 prototype vehicles; but due to funding limitations, we bought only eight — hardly enough to meet all the demands for prototypes, let alone ballistic testing. But the program made do with the eight and received a production go-ahead based on the testing of that number. When a requirement for live-fire vehicle testing against large mines came along, my successor, Brigadier General Phil Bolté, looked long and hard for ways to meet the requirement without destroying one or more of his limited number of prototypes. Hence the use of the MICV monument vehicle from Fort Benning as a cost-, time-, and prototype-saving measure. The MICV could be used because its chassis, from a ballistic protection standpoint, was identical to that of the Bradley. The MICV "monument vehicle" was shipped to Aberdeen Proving Ground, exposed to mines of various sizes, and finally, partially destroyed by a large mine. It was externally refurbished and then returned to Fort Benning, where it stands today.

While expensive and probably unnecessary, the OSD-directed live-fire to destruction ballistic testing did reveal some things about the Bradley vehicle that resulted in refinements to its protection prior to Desert Storm. These included the addition of Kevlar spall liners inside the vehicle (which had been recommended earlier, but not approved due to cost); the restowing of some ammunition from inside to outside of the vehicle; some restowing and rearrangement of the fighting compartment to better protect the crew; some fuel storage tank relocation; and the addition of external, bolt-on armor to enhance protection over critical areas. As a result, the A2 Bradley of Desert Storm and later is a better protected vehicle than the early production vehicles, which are now all being upgraded to the A2 configuration or better.

"One has to wonder, was the result that cost the Army a company of Bradleys worth the time and expense? I don't know the answer, but I can say that the Army did not learn very much from this testing which it did not already know."

Finally, a question that begs answering is, "Why didn't the Army, on its own, plan for and conduct vehicle live-fire testing?" The answer is simple: it couldn't afford the cost, nor did it deem such testing necessary. In the final analysis, the accomplishment of the testing required specific direction and extra funding from OSD. One has to wonder, was the result that cost the Army a company of Bradleys worth the time and expense? I don't know the answer, but I can say that the Army did not learn very much from this testing which it did not already know. But the protection afforded America's soldiers by today's A2 Bradley is superior to that of early production vehicles and may be responsible for saving soldiers' lives.

And what of the Bradley derivatives, or support vehicles, during this process? In 1975, the U.S. Army had a need for a tracked vehicle platform for the Artillery's Multiple Launch Rocket System (MLRS), and the Bradley vehicle chassis was chosen as the candidate platform. In reality, what the Army really wanted was a highly mobile, tracked "pick-up truck" whose truck bed could be used for many battlefield missions, but at the time the only money available was for the development of the MLRS carrier. Adopting the very successful and reliable automotive and suspension components of the original MICV chassis, the MLRS carrier was developed, tested, accepted, and fielded with almost complete commonality with the chassis of its sister fighting vehicle. The differences between the two are in the physical, rather than mechanical, aspects of the chassis. Again, the proof of this derivative was its complete success and soldier acceptance in the combat of Desert Storm. At the same time, the Army got its "pick-up truck." Today the derivative carrier's time has come. Among other uses, it is being strongly considered by the Army as the basis for a command and control vehicle, an ambulance, and a communications vehicle.

Looking back, and forgetting the pain along the way, one can say that the Bradley was a success story. This was primarily due to the Army's belief in, and support for, a fighting vehicle and its MLRS derivative, along with the dedicated hand-in-hand team effort by all those directly involved in its development, production, and fielding — the U.S. Army Program Manager's Office, the infantry, cavalry, and artillery users, and all of the many dedicated civilian contractors who went the extra mile for the program. The development buzzword today is PARTNERING, or the joining together of all those involved in a development program toward a common goal. Without knowing it, that is what was done with the Bradley in the 1970s and early 1980s, long before the word or the thought was in vogue in the Defense Department.

While the birthing process may have been difficult and lengthy, the Bradley systems turned out to be worthy members of the U.S. Army's force of mounted warriors, joining and complementing the Abrams tank and the Apache helicopter, forming a combined arms team to be reckoned with on any battlefield, anywhere in the world.

Major General Stan R. Sheridan, a 1951 graduate of the U.S. Military Academy, commanded armor units from platoon to brigade in a career that spanned more than 30 years. Much of his later career was spent in development of major weapon systems, including serving as program manager for the M60 tank program and first PM of the Bradley program. At his retirement, he was the Assistant Deputy Chief of Staff for Research, Development, and Acquisition and Deputy Chief of Staff-RDA for International Programs at DA HQ. He is now retired in Naples, Florida.

Problems Persist, But Continuous Band Track Shows Promise in Light Armor Applications

by Paul Hornback

The U.S. Army continuously seeks to reduce operating and support (O&S) costs for fielded combat systems while developing future combat systems that exhibit ultra high reliability with lower maintenance requirements. As the Army evolves from Army of Excellence (AOE) to Force XXI and beyond, we must achieve increases in force sustainability without sacrificing critical mobility, lethality, and survivability attributes. This remains a formidable task for legacy tracked combat systems, and will be a challenge for future systems unless we adopt changes in track design and materials.

It has long been an accepted fact that tracked vehicles provide a stable weapons platform with excellent all-weather mobility over a wide range of terrain.[1] However, the superior mobility of tracked platforms has traditionally incurred a substantial cost penalty. Historically, steel-tracked vehicles have higher O&S costs than wheeled combat platforms.[2] The higher O&S costs are directly attributed to the rougher terrain profile characteristic of tracked vehicle employment (tracked vehicles endure a greater percentage of cross-country mileage than wheeled vehicles)[3] as well as the maintenance burden imposed by their track and suspension systems. Furthermore, steel tracks inherently produce vibrations that adversely impact the reliability of onboard electronic components, contributing to even higher O&S costs.

Continuous band track technology is not new and currently exists on Caterpillar 30/30 tractors, agriculture tractors (where soft soil mobility is critical), Small Unit Support Vehicles (like the Finnish SISU NA-140 all-terrain articulated vehicle) and Light Weight Trailers. The U.S. Army Tank-automotive and Armaments Command (TACOM) has awarded Caterpillar a contract option for producing the Deployable Universal Combat Earthmover (DEUCE) equipped with a continuous rubber track. Rubber track was selected to reduce Gross Vehicle Weight (GVW), thereby enhancing DEUCE deployability. The DEUCE can be parachuted into a combat zone and, thanks to its rubber tracks, can travel at speeds of up to 30 mph, permitting self-transport rather than truck/trailer transport.[4] A rubber track system has also been developed, tested, and approved by the Canadian Department of National Defence for the Hägglunds BV206 vehicle, with test results indicating three times the life of the original Swedish-supplied track.

Manufacturers, like Soucy International, claim continuous band tracks provide enhanced on/off road mobility through reduced ground pressure, better traction and lateral stability; reduced platform vibration, noise, radar/acoustic signatures, weight, and rolling resistance; improved track life; corrosion and maintenance-free operations; and lower life cycle costs.[5]

The U.S. Department of Defense and U.K. Ministry of Defense (MOD) have recently experimented with continuous band track on lightweight armor platforms. The continuous band track (commonly referred to as rubber track) is an endless, synthetic rubber molded track with internal drive system. The molded track is reinforced with Kevlar, nylon, polyester and/or glass fiber to provide rigidity and increased track life. Both the U.S. and U.K. are interested in determining the feasibility and military performance enhancements resulting from continuous band track on armored combat platforms.

To verify the purported benefits of continuous band track, the U.S. Army evaluated an experimental band track on the M113A3 armored personnel carrier while the U.K. experimented with a similar track on a Combat Vehicle Reconnaissance (Tracked) (CVR(T)) platform. U.S. and U.K. test reports noted the following significant results:

- M113A3 paved surface rolling resistance for the band track was 67% less than the current T130 track. No significant difference was noted for operations in sand.[6]
- A 1,600-pound weight reduction was realized on the M113A3 equipped with band track as compared to the T130 track.[7] On the CVR(T), the weight saving was 30%.
- M113A3 internal and external noise levels were 6 dB lower for the band track than for the T130 track.[8]
- The CVR(T) with band track achieved a 50% reduction in platform vibration.
- M113A3 band track durability (the point at which track separation occurs) was approximately 4,700 kms when tested over 20% primary (paved) roads, 40% secondary (gravel) roads and 40% cross-country at a 12 tons GVW.[9]
- Maintenance events for the M113A3 band track system included two drive sprocket replacements, two track throws (the same track was reinstalled), one idler wheel replacement, and three incidents where multiple wheel studs required tightening.[10]

Detail view of the continuous band track installed on an M113 APC during recent tests.

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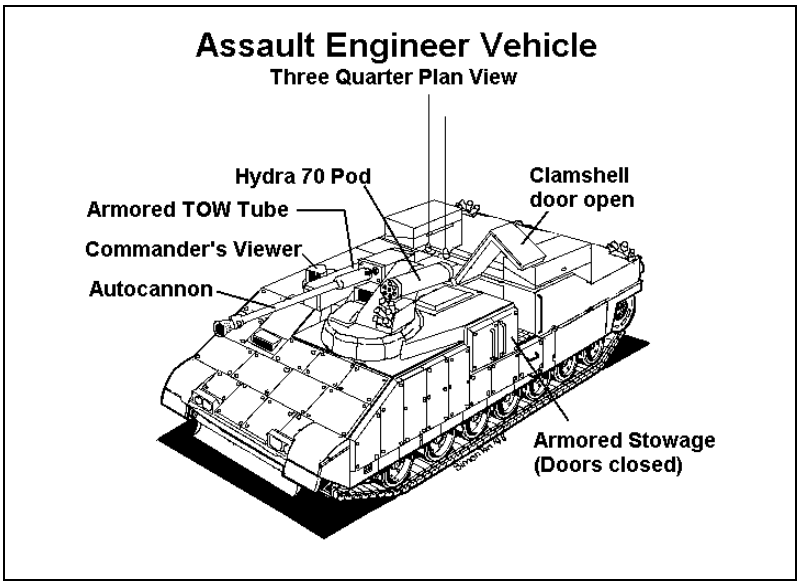
Is the Bradley Heavy Enough to Replace The M113 in Combat Engineer Units?

Author's Proposal Calls for Modifying the M1 Chassis

by Simon Tan



Although it is usually uneconomic to build small numbers of specialized armored vehicles, we thought the author's reasoning and discussion worth including in this issue. – Ed.

Consideration is now being given to mounting combat engineer squads in Bradleys, rather than M113s, but neither the M113 nor the Bradley is adequate for this purpose. A better idea would be to adapt a turretless M1 tank chassis as the basis for a new engineer vehicle.

First, let's examine why the M113 is no longer adequate:

- It is too slow to keep up with Bradleys and M1s.

- It is too thinly armored, and improving that armor would add too much weight.

- It is poorly armed, with only a .50-caliber machine gun, and the operator is exposed to enemy counterfire.

- It is being phased out, creating logistic problems.

In some ways, the Bradley would be an improvement. It has better firepower, more speed, and greater mobility, but it also has major drawbacks:

- There is insufficient internal space to carry a large engineer squad and the many specialized equipment kits they will use.

- To create more space, it would have to jettison its TOW launcher and missile storage.

- Considering the high-threat environment in which engineer squads typically work, there is insufficient armor protection on the Bradley, compared to a tank.

The Soviets and the Israelis have recently developed specialized engineer and infantry fighting vehicles fabricated from tank chassis. The Israeli Achzarit is a troop carrier developed from a T-55 tank chassis. The Israeli Puma engineer vehicle is a converted, turretless Centurion tank. And the Russians have adopted some of their T-55 chassis, removing the turret and adding a new top deck, to create the BTR-T, apparently a reaction to the way lightly armored BMPs were destroyed so easily in the Chechnya fighting.

My proposal is derived from the Israeli experience with the Puma Centurion conversion in particular. This is a specialist assault transporter for their combat engineers. It provides the occupants with MBT protection and mobility. Other heavy APC/IFV developments, such as the Achzarit and BTR-T, have also emerged. These vehicles can be described as assault transports intended to deliver their occupants into a high threat situation.

I believe a similar vehicle would be a significant addition to the combat engineering capabilities of the Army.

The Vehicle

We shall call this proposal the AEV or Assault Engineer Vehicle. It will be based on the M1 Abrams and be converted from surplus stock. This reduces both the cost and gestation period of the project. The conversion would involve:

- Cutting away the turret ring and building up a low, heavily armored (MBT standard) superstructure for the crew compartment. The M1 should be able to comfortably carry a six-man dismount section. Ingress and egress to the troop compartment will be via roof hatches and a side clamshell door on either side of the troop compartment. The latter would be used under fire as it avoids dismounting over the top. A rear-facing clamshell arrangement, as on the Achzarit, is unnecessarily complicated.

- Stowage of bulky equipment would be in external armored bins fitted along the side of the superstructure. This eliminates the need to handle the equipment in and out of the troop compartment. It also doubles as spaced armor.

- Fitting a low-profile, one-man turret with an auto-cannon like the M242 Bushmaster or equivalent to the front left corner of this superstructure. A two-man turret will simply take up more space within the fighting compartment and increase weight. A turret such as the one found on the Marder would be ideal as it reduces the exposure of the gunner.

- The commander will be equipped with independent panoramic sight with thermal channel.

A single tube TOW launcher would also be fitted on the side of the turret. This is intended to fire "DEMO-TOW," a demo-

lition/anti-materiel variant of the TOW family. Using surplus TOW and ITOW guidance and propulsion units, this weapon will have a 6-inch diameter warhead comprising a reinforced penetrator cap, a fuel-air explosive (FAE) warhead module, and a high-impulse rocket motor. The weapon is intended to have two operating modes, impact and delayed. In the first mode, the missile explodes upon impact, this being used for attacking unprotected structures. In the second mode, the rocket motor will ignite before impact and propel the warhead into the target. Operation is not unlike a runway cratering weapon. Penetration should be at least 12 inches of reinforced concrete. The weapon would then explode inside the structure.

The weapon should also be very effective against a wide variety of targets. Warhead weight can be quite high as the weapon does not need to exploit the full 3,750m range of TOW. A 2,000m range should be quite sufficient. Conventional HE payload can be substituted if FAE is not considered politically feasible.

The AEV would carry 6 rounds for the launcher and would normally consist of five DEMO-TOW and one TOW 2A/B for self-defense. Reloading would be from under armor, using a roof hatch as on a Bradley.

Roof-mounted, remotely operated machine guns, such as those on Israeli armored vehicles, could be fitted for extra firepower. The crew would consist of a driver, gunner, and vehicle commander.

Some additional features that could be added include:

- A dozer blade at the front of the vehicle. This would be retractable and have full width extensions. Mine plows could be fitted.

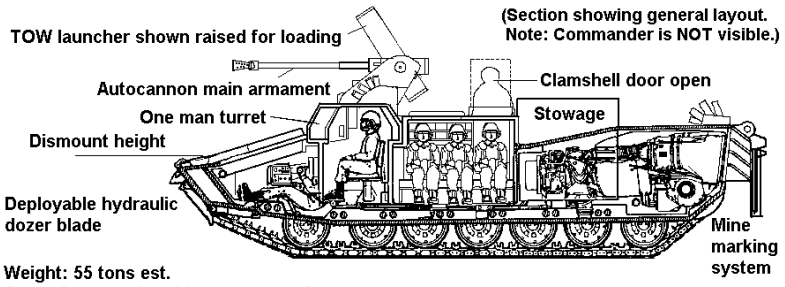
- IRA/VRA armor arrays could be added to improve survivability. ERA would be unsuitable as it poses a hazard to the dismounts.

- Additional smoke dischargers could be attached at the hull rear as well as the turret. Obscuration during dismount will be important and the number of dischargers should exceed 16. Additionally these dischargers could be loaded with APERS munitions for MOUT operations.

- There could be mounting points on the rear deck for line charge/FAE launchers to clear minefields.

- An automatic minefield marking system installed on hull rear edges could perform like the system on the minefield-marking BRDMs.

Armored Engineer Vehicle (AEV)



Weight: 55 tons est.
Crew: Commander, driver gunner + 6
Armament: 25mm + autocannon (300 rounds)
7.62mm Coax MG (3000 rounds)
TOW launcher (7 rounds)

Automotive: as per M1 series
Notes: Commander equipped w/ independent thermal viewer

- There should be provision for carrying fascines on the rear deck and sides.

- Adding a towing pintle for an armored trailer would permit carrying extra engineering stores. It should be capable of remote jettison from the fighting compartment.

Comparisons

Even with all the modifications, the vehicle should still weigh less than a full M1 and be able to use Class 70 bridges and equipment. It would have better mobility than the Bradley, and much better armor protection. It should have survivability equal to or better than the M1, and armament as good as or better than the Bradley. With its dozer blade, plows, fascines, and explosive mine-clearing capability, it would be versatile in breaching situations. The vehicle would be capable of integral mine marking. And there would be plenty of space for external armored stowage.

Organization

The conversion of 60 vehicles would be adequate to form a special Armored Assault Engineer Battalion. It would be composed of four Armored Assault Engineer Companies, each with three platoons of four vehicles and two in the HQ section. Four would be held as reserve in battalion. Regular armored engineers would cross train in the use of this equipment. Drivers, gunners and commanders would be organic to the battalion but the dismounts would not be. Companies could be attached to brigades as required, rather than being organic to their structures. They should be considered at least a corps asset. Companies should be committed together. Piecemeal use should be discouraged. Units would always work in cooperation with other arms, not alone as assault infantry. Support companies will be required to support deployments. These should include mechanics and resupply elements. Finally, this vehicle would be an excellent adjunct to the Grizzly ACEV.

Costs

The basis of the unit would be 60 used M1 hulls, which are paid for. Equipment and conversion should cost no more than $1.5-2 million per unit by conservative estimate.

To create DEMO-TOW missiles, we could use TOW propulsion units available for remanufacturing, which should reduce costs. The warheads would have to be created. A rough estimate is that these missiles would cost under $25,000 per unit, and they would have a wide range of applications beyond AEV.

Time Frame

Using fast track management and revised bidding, I would expect a working prototype by 2001 and IOC by 2003-4 at the latest. The project should be a requirement, not contractor-driven. Ultimately, this would be a low-risk development with short gestation to provide a significant enhancement to combat engineers at a reasonable price.

Simon Tan trained at the University of Edinburgh from 1991-1997 as an architect. He intends to pursue a further academic career in military science in the future. He has always had a keen interest in military subjects, in particular armor. His major areas of focus are armored tactics and doctrine from WWII to the present, with particular interest in battalion/brigade operations and wider operational issues.

Through the Breach:

A Tanker Searches for a Common Perspective

by Captain Jeffrey Erdley

> *"Operation Desert Storm showed that our World War II-vintage minefield breaching and clearing capability, coupled with the lack of demolition expertise, resulted in an inability to technically or tactically breach the modern minefields that we faced."*
>
> *- Operation Desert Shield/Desert Storm Engineer Observations*

Quotes such as this may stir emotions of disbelief in some U.S. forces because all of the breaches during Desert Storm were successful. It is important to note, however, that the majority of our forces (except the Marine divisions and a brigade of the 2AD) maneuvered far to the west of the main defenses. In every case, the Iraqi resistance proved vastly weaker than predicted — a fact that thankfully negated the 80 percent casualties predicted for U.S. breaching forces. I served as an acting engineer platoon leader with B/23d Engineers (1st Armored Division) for a CMTC Hohenfels rotation, and conducted well over 100 breaches as a tank platoon leader, executive officer, and acting commander of armor-heavy teams. I've been fortunate to have had both tanker and engineer viewpoints through both field training in local training areas and CTCs, and formal schooling both at Fort Knox and Fort Leonard Wood. Through my experience, one fact has proven itself over and over — the maneuver arms and engineers lack a common understanding of breaching and only work together when forced upon each other for a breach. *FM 90-13-1, Combined Arms Breaching Operations*, lays the framework for a common vision; however, in the field, the principles of this manual are not always followed nor understood.

The Doctrine

Armor and engineer units in the field often proclaim that their branch can "do it alone" as both types of units possess the necessary equipment to create a lane through an obstacle. While engineers are experts at explosive and manual operations, the tanks control the plows and rollers for mechanical reduction. Each branch also practices reducing smaller, easily constructed obstacles on our own. This is not necessarily a bad thing, since the speed and momentum of maneuver forces require that we breach quickly without waiting for engineer support to come forward. *FM 71-2, Tank/Mech Infantry Battalion/Task Force*, states, "*Combat engineers are located with the breaching force of the battalion to perform hasty breaches. However, time and distance factors may require hasty breach by maneuver units without direct engineer participation*." Likewise, engineers are often thrust forward of both light and mech units and told to reduce obstacles with little more than direct fire support. The disjointed manuals may be corrected with future versions of *FM 71-2*, as the engineers don't even use the term "hasty," and the new *FM 90-13-1* will eliminate each distinct operation (deliberate, in-stride, etc.) and designate them all simply as "a breach." Therefore, in my experience, we often view each other as adversaries getting in the way of the mission. It is important to realize that creating a lane through an obstacle is not conducting a breach, but rather just one small part of the operation. A breach is a combined arms operation involving not only engineers and tankers, but every BOS element. Somewhere in the middle of the engineer and armor high grounds is the truth about the most effective way to work together in breaching an obstacle and continuing the attack. This is where task force and brigade combat team rehearsals and training become essential — before deploying to the field. It is imperative to develop a cohesive plan for breaching operations as early as possible and to bring all participating elements together to orchestrate this complex operation.

Through refinement, the breach plan can be developed and captured in the unit's SOP as an effective reference for both maneuver and support units.

Current doctrine provides little insight as to what this effective middle ground is. Most of the armor manuals reserve a few pages to roller and plow operations and

simply state that for larger obstacles we will get support from the engineers. The engineer manuals are no less guilty as the obstacle reduction capability of tanks is viewed as an afterthought, mainly for proofing. Even the doctrinal bible on breaching operations, *FM 90-13-1*, barely mentions tank breaching, saying that tank plows and rollers may be used in the breach. *FM 20-32, Mine/Countermine Operations,* dedicates only a single page each to the plow and roller. We shouldn't forget that the introduction of British tanks in World War I opened the wire and trenches in France to help end the stalemate. Since there is no effective manual on the tactical employment of either the plow or the roller, tankers must discover the tactics, techniques, and procedures on our own for unit SOPs and operations. To spur some ideas and raise awareness, I'll offer some personal observations on identifying obstacles, ways to maneuver to them, notes on the equipment, and techniques in the breach that proved successful in the field.

As with any successful combat operation, a successful breach begins with accurate reconnaissance. Through trial and error, we learned that the most effective method of locating obstacles, bypasses, and breach locations was to put engineers in scout vehicles overwatching NAIs to gather obstacle intelligence. The armor battalion's scouts know the task force or brigade combat team commander's intent, and have the "maneuver view" of how to conduct the operation. But no one has more knowledge of obstacle composition, dimension, and purpose than the engineer. With the two together in one vehicle, they formed an efficient team to locate the obstacles, locate and mark the bypasses, create lanes, and determine the point of breach. Other reconnaissance assets, such as the Brigade Recon Troop, UAVs, scout helicopters, and even COLTs may be available, depending on the priority of the mission in the overall scheme of operations.

Even as reconnaissance is being deployed, the commander and staff must immediately start planning for the breach in every offensive course of action development. It is safe to assume that our forces will be under both indirect and direct fire since the enemy uses obstacles to channel and separate forces just as we do. With speed at the breach in mind, the TF or BCT breach force must maneuver toward the front of the formation. If a breach is imminent, their best location is second in the order of march. Both *FM 17-15, The Tank Platoon,* and *FM 71-2* state that the lead tank should be the roller tank since it is designed to detect the minefield in a breach. This technique may be effective if units cannot visually identify mines or locate them with the tank's thermal sights. It may also work in finding enemy FASCAM, but it is important to realize, with the density of both conventional and situational minefields, that the roller tank may be well past the leading edge of the minefield before the roller hits a mine. I've never observed this technique to be effective, since the roller tank is a massive, lumbering beast ill-suited to lead a combat formation. Instead, the lead tanks must be killers on point that clear the immediate area for the formation and can fix enemy vehicles with direct fire while the plows and rollers move behind terrain or at a safe distance into their breach positions.

A successful AVLM launch and blast clears the path for a 3-67 Armor M1A1 west of Drinkwater Lake at the NTC.

Within the tank company, the MTOE distributes one plow to each platoon, with a roller on another tank in the company. Since the tank platoon rarely maneuvers on its own, and never in the breach, this serious violation of unity of command is usually corrected through task organization in the field (much to the hand receipt holder's resentment). The most effective breach forces I have seen have had all of the reduction assets massed in one platoon. In a few missions, we attempted to attach this platoon under an engineer company commander. However, this led to disastrous results every time because of the loss of guns in the battle. The tanks were treated as engineer vehicles only and the company's killing capability was reduced by 1/3.

To be successful, the maneuver chain of command must remain intact. This fact is just as true for the engineer companies and platoons fighting the mission. The maneuver commander commands the breach force, but within that force, the engineer commander may control that reduction element. This allows the maneuver commander to concentrate on the security element and the critical task of controlling direct fire at the breach site.

Contrary to the beliefs of many soldiers I've worked with, the plow does not necessarily slow a tank during movement. The main planning consideration for plow tanks is to keep them away from wadis, streambeds, non-MLC bridges, and other restricted terrain. The tank is much longer with a plow attached and cannot drive through steeper dips. If the plow does dig in, crews must dig the mud and dirt off the plow immediately. The added weight routinely causes seals to burst on the suspension in the front of the tank.

The Equipment

The equipment available for the breach is not limited to the tankers' and the engineers' AVLBs, AVLMs, MICLICs, Bangalores, and grappling hooks. A successful breach is a combined effort that includes the engineers; the indirect, counter-battery, and smoke missions of the field artillery and mortars; aviation fires; infantry support; and sometimes even the smoke of the Chemical Corps. All of these systems are excellent in their own way, but for the purpose of this article, I'll concentrate on the M1 plows and rollers and methods of integrating them with the engineers.

Armor manuals are fairly weak on breach missions. Three methods discussed in *FM 71-2* are a plow/roller combination, using the M88 with its blade down, and just driving through. *FM 17-15* still teaches the disastrous method of staggering plow tanks to create wider lanes. This inevitably leads to a live mine in the spoil exploding on the second tank. That manual also still instructs tank platoon leaders to mark lanes with CLAMMS — fortunately, I believe most of these were turned in after proving useless. Instead, the most effective method of tank obstacle breaching is the mine plow. The plow digs below mines and then uses spoil to push them to the sides. Any vehicle that stays within the track of the tank is safe from mines.

The tank roller may have been good in intent, but is generally loathed in the armor community as more trouble than it is worth. Several tank manuals suggest

leading an attack with your roller tank to find the leading edge of the minefield. However, anyone who has maneuvered with them quickly understands that an attack with a roller point man would have all the momentum of a lethargic snail. The roller was designed to be carried to the battlefield on a lowboy trailer, and the receiving tank would already have the mounting kit secured to the front slope. The crew only installs the rollers on the tank in the attack position before crossing the LD, maneuvers toward the breach, drives through as the proof tank, and drops them on the far side to be retrieved later. In this mission, and this mission only, the roller is effective, but prolonged use of the roller can severely damage a tank. During one field problem, my wingman had to keep a roller on his tank for the entire month because of lack of support to transport them. It took about nine months to replace or repair all the shocks and seals of the suspension that were destroyed by the extra weight. The other division at that post never even used their rollers; I never saw them moved from the far corners of their motor pools. In January 1996, I got a late Saturday night phone call to do some quick repairs on three of our four rollers and get them on a plane at Robert Gray AAF Sunday morning to go to Bosnia. Of course, I didn't shed any tears when that plane left.

There is also a major Class IX problem with both of these systems. Neither system is reportable, so we could order all the parts 02, non-deadline. Even with this priority, the average plow part expected ship date (ESD) was about nine months, and about a year for the roller. Without being reportable, these systems lose the visibility they need to be fixed properly. Currently, crews cannot fix deadline systems; therefore they can't train on them. After only a short time, no one is familiar with them, and then they are just ignored. Not even the item managers could help us get these parts faster because the lack of emphasis on these vital tools.

During most heavy task force operations, engineers I've worked with have believed that the Holy Grail of breaching is the MICLIC/AVLM. Although not an armor system, it is a tool we, and our engineers, worked with quite a bit. The prevailing belief in armor when we saw the MICLIC or AVLM getting ready to go toward the point of breach was simply, "Get our plows ready, the MICLIC won't work." Even engineer AARs from Desert Storm contained the following conclusions: *"Units place an overreliance on the MICLICs as the answer to all their breaching problems. This was due to the ignorance of threat mine capabilities, poor MICLIC training at home station, and the general lack of an effective training device or training strategy." "The MICLIC system suffered from several serious shortcomings. During test firings, the system suffered a 50% failure rate."* Even when the MICLIC successfully fires, it can only clear a 100-meter long path in the obstacle. This is excellent for smaller obstacles, but in many breaching operations, the obstacle is very deep. *FM 90-13-1* also acknowledges that the MICLIC has a "skip zone" where mines are left untouched, and deeply buried mines, non-pressure fuze mines, and overpressure-resistant mines prove very resilient against the MICLIC. A major advantage of the tank-mounted systems is that they can keep going through the obstacle without the lengthy firing process. Knowing that engineers cannot accomplish the breach alone, it is essential that they work together with the tankers.

Techniques

The methods of obstacle reduction I'll discuss here are simply the combination of a MICLIC and plow tank and then briefly the plow tank and a roller tank breaching a wire and mine obstacle. The combination of reduction assets and methods to use them are only limited by your imagination, but these are the two methods I have used the most. Regardless of the method, all breaches must be the task force or combat team's main effort. The attack hinges on this mission, and therefore every asset, including the most ammunition, close air support, priority of fires, Firefinder radar, and smoke platoons must be concentrated at this decisive point. With them, the commander must build the breach fundamentals of suppress, obscure, secure, and reduce (SOSR). To accomplish this, the breaching unit is organized into the support, breach, and assault forces. When forming these forces, it is critical to retain unit integrity and the existing chain of command. Success hinges on keeping each platoon or company intact under its own maneuver commander, with the engineer commander as a right-hand man. When the teams are set and putting fire on the enemy, the support force leader must call for the indirect fires and smoke missions. His mission requires a good view of the battlefield, and he is usually the best to have the overall view and control these fires. Both artillery and the armor battalion's mortars must be used to the fullest for fires and smoke missions. But when these fail, the tanks can also fire volleys of HEAT rounds in front of enemy positions to create obscuration from the dirt. When the effects of all these systems is beginning to peak, then and only then, the force has set the conditions for commitment of the breach force. Whatever the method, the end state must always be the same. The maneuver force must get through the breach quickly to continue the assault and kill the enemy.

After setting the conditions for the breach through SOSR, most engineers I've been around have preferred moving the plow tank into position 100 meters before the obstacle with the MICLIC directly behind. This technique provides some cover for the MICLIC crew or AVLM while they sit exposed in front of the enemy for the minutes it takes to raise, lock, fire, and detonate the charge. A very well-trained tank crew may also be able to set the engineers up for success on the MICLIC launch by halting at the correct stand-off distance for launch and set perpendicular to the obstacle. Immediately after the explosion, the tank is then in position to start plowing from his position and go through the obstacle while the enemy may still be disorganized after the large blast. During the time the MICLIC crew is getting set, the tank crew can drop the plow and verify that it is locked down. Once the rocket is fired, the breach moves very quickly.

From the tanker's perspective, this technique does work, but is filled with actions that are setting up the breach force for failure. It is obvious that the attacker must place a huge volume of fire on the defender during the entire mission. However, with the plow tank directly in front of the breach, where our own obscuration smoke and, hopefully, burning enemy vehicles may obscure his view, his main gun is effectively taken out of the fight. When the enemy does spot the tank and MICLIC at the point of breach, they now have a much larger (two vehicles end to end) target to aim at for the several minutes that they sit in a known fire sack. This is when everyone finds out if the suppressive fire was effective or not. In this time, the enemy forces can destroy the attacker's best tools for getting through the breach and deny the commander his best place to put in the lane. Even if they are successful, and the plow tank crew survives the enemy fire, they now have to face the fact that a 25-year-old vehicle is about to fire almost a ton of high explosives over their heads, using a system that has a misfire rate of about 50 percent. As soon as this warm and fuzzy time is over and the MICLIC successfully explodes to start the breach lane, the plow begins pushing through the blast area.

Because the MICLIC was the reduction asset, the plow is the proofing system. Immediately after the blast, the tank plow

begins moving through what is left of the wire and mines. The tank must go on a straight path because it cannot turn without risking damage to the plow tines. The turret should be traversed to the left so that any mine blast to the front does not damage the gun tube. If the turret is traversed to the right, the tank commander is set further back and would have problems seeing to the front and determining the far edge of the obstacle. Some crews also install a makeshift wire-cutting device in the center of the blades. This device allows them to cut and then push away the concertina, where it might otherwise get dragged before breaking. This won't stop the tank, but it could damage the plow by cutting the nylon lifting straps, and may get caught in the track.

Armor and engineer doctrine on plow employment represents the extremes of plow performance, while the best answer lies somewhere in between. Many of the armor/joint publications state that the crew can drop the plow as little as 10 meters in front of the obstacle and then plow up to 10 mph *(FM 71-2)*. The tank platoon ARTEP lists no standards. Engineer manuals bring the drop point back to 100 meters with a speed below 10 kph *(FM 20-32)*. (Bear in mind that the M1 speedometer is in kph.) Both specifications are right and both are wrong: the only way to be sure the depth setting and plow speed is effective is to conduct a rehearsal. By plowing a practice lane in the area of operations similar to the soil conditions at the obstacle, the commander can quickly (after two or three practice lanes) determine the best depth and speed to dig out mines and produce sufficient spoil to push them to the sides. The blade drop point and speed can also be refined in a rehearsal. The best case is to drop and then begin movement to avoid damage to the tines by dropping while moving, although this is also dependent on local soils. After the plow creates a lane, the mine roller simply follows the exact path through the obstacle to detonate any remaining mines. He should travel at the same speed as the plow tank, with the gun tube again over to the left, and then exit the lane to the right in a hasty defensive position. In theory, the roller can withstand two mine hits per roller and continue to be effective as a proof. Regardless of the exact method, several systems must work together to breach, proof, and mark the lane.

The plow can dig down to 8, 10, or 12 inches, the depth to be set prior to the mission, based on the ground conditions (the softer the soil, the deeper the setting). Not only is this depth critical, but so is the installation of the plow's moldboards. These force the spoil farther to the sides of the tank and create a wider lane while preventing mines from falling back into the lane. Once the tank commander is sure that they have plowed beyond the far edge of the obstacle, the tank must briefly stop, back up, and raise the plow. This only takes a few seconds, and then the plow tank should always move off the lane and set in a suppressive fire position to the left of the breach lane. Because the plow control cables run through the driver's right vision block, it is safest to drive to the left so he can see where he is going while the gunner is free to traverse and look for targets.

Although the breach is now well established, it is not complete until it is marked. The MICLIC and path dug by the plow are very distinctive, so the immediately concern is to mark the exact entrance and exit. VS-17 panels are excellent markers at both ends. We used the red side on the right and orange on the left. The exit point is the most critical under fire, because many combat vehicles in training turn off too early and end up running right into the minefield. At night, filling plastic water bottles with chemical light fluid for markers can enhance the VS-17s. We used to use "tippy toms" to mark the left handrail of the lane because engineers can just throw them out as they move through, but they are usually not very useful when the path is dug. Any initial method that clearly marks the entrance, exit, and path of the breach is essential and must be continually improved (reducing the obstacle) for follow-on units. (See *FM 90-13-1,* App E)

When tank units conduct breaches without a MICLIC or AVLM, we train to do them with only a plow and roller. We still follow the basic tenets of breaching as the MICLIC/plow combination, but with this method the plow does the breaching and the roller does the proofing. Without the roller, tank units are forced to use a "Hollywood" tank through the obstacle first to proof the lane. It is a grim job, but if the tank doesn't hit a mine, then the lane is proofed. Regardless of which reduction/proofing combination the commander decides to use, the plowing portion is almost identical to the process previously listed for the MICLIC/plow combination. The only difference is how the plow tank begins its mission. When terrain allows, the plow tank is most effective if it can remain behind an intervisibility line while the conditions are set for the breach. The commander can talk to that TC to position him directly in front of his desired point of breach, so that when he orders the plow forward it simply and quickly (shock effect) drives straight to it. This is another point where the doctrine falls apart. The blade drop point and speed of the tank may seem simple, but have drastic effects on the quality of the lane.

Synopsis

In the heavy force breach, the maneuver commander has to synchronize every available battlefield operating system to set the conditions for a successful breach and continued attack. No one system, or even branch, is able to accomplish this mission without direct involvement and assistance by others. A major problem facing the combined arms team today is a lack of understanding of the common doctrine in *FM 90-13-1* on how to execute this mission. The primary soldiers in the breach are the tankers and engineers, but even our schools teach different methods of execution. Then, when we come together in the field to plan and execute the mission, the officers haggle over exactly what to do.

To alleviate this confusion, we need to develop more effective combined arms doctrine and tactics, techniques, and procedures on the breach. If we start by locking a bunch of tanker sergeants and captains in a room with their sapper counterparts, they may be able to find some common ground before the balloon goes up. With common doctrine, the tankers and engineers will complement each other very well in the combined arms breach, with reinforcement by every available battlefield operating system. Through combined TTP development, refinement, implementation, and training, we can set the conditions for a coordinated effort between all BOS elements on the battlefield. As individuals, or individual units, we can do many great things. Acting together as a cohesive team with common doctrine, we can accomplish anything, even an operation as demanding as the breach.

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Team Blade and Survivability Management

by Captain Pete Huie

As the task force began to consolidate on the objective, LTC Stone surveyed the broad expanse of land in front of him. Thirty minutes earlier, remnants of an enemy mechanized infantry company had retreated across this terrain. The task force commander knew they would return in the form of a brigade-sized counterattack, probably in less than 36 hours. To his right and left the land was void of any relief, with not even the slightest undulation. He'd need the support of the attached engineer company, or his task force would have no choice but to fight from above ground.

The good news was that the three surviving M9 Armored Combat Earthmovers (ACE) from his assault force were now beginning to scratch out fighting positions for his main effort. A fourth ACE had been damaged as it proofed a breach lane during the earlier attack. The remainder of the engineer company's ACEs were racing up to the battle position to begin digging in his company teams. These ACEs would help, but much of his task force would still be above ground when the enemy brigade counterattacked. The task force – and ultimately, the brigade's defense – would depend upon the successful execution of the engineer battalion's Team Blade.

During home station training and the most recent National Training Center rotation, the brigade had successfully adopted the Team Blade concept. However, this would be its first use with a full brigade and in combat.

Team Blade is a consolidation of all blade assets within the brigade, designed to rapidly construct both vehicle and dismounted fighting positions. The concept was developed in response to decreasing maintenance assets within mechanized engineer battalions and in an effort to streamline command and control of the brigade survivability mission. Team Blade is formed during the defense from organic and attached blade assets. The alternative was to use the ACEs in attached engineer companies to dig in their supported task force. This was a slower process, especially as ACEs experienced mechanical problems and the company's mechanics were unable to fix them with their minimal assets. Through the use of a forward unit maintenance collection point (UMCP) under control of Team Blade, the battalion's engineer mechanics are able to provide immediate organizational and direct support to all blade assets.

As LTC Stone and his company team commanders conducted a reconnaissance of the engagement area, Team Blade began to consolidate behind his battle position. Consisting of the battalion's 21 M9 ACEs, 6 SEE tractors, attached D7/D8 bulldozers from the corps Combat Support Equipment Company or Combat Heavy engineer battalion, M88 recovery vehicle, the battalion shop equipment truck and welding trailer, and command and control vehicles, Team Blade provides the brigade combat team (BCT) a means to rapidly and efficiently prepare its defense. Led by the engineer HHC commander, the team establishes its UMCP Forward two to three kilometers behind the task force battle position. The Assault and Obstacle Platoon Leader (PL) from the engineer company supporting the task force in sector, controls the blades on and between company positions and serves as the point of contact for the company team commanders. While the UMCP Forward is being established (Figure 1), the attached bulldozers are brought forward, and the A&O PL moves to contact points on the task force boundaries to link up the remainder of the engineer battalion's ACE and SEE fleet. The task force has tasked a section of tanks to provide security for the lightly armed convoy.

Using the UMCP Forward as a rally point, the battalion's blades are consolidated and moved to the first company team battle position. By this point, the TF engineer and TF commander have established a survivability timeline based on the brigade's timeline and guidance. The brigade order may also establish a priority of missions and vehicle fighting position standards. From this, the task force commander knows if blades can be used in his countermobility planning and the types of positions he has time to prepare. In this case, the BCT commander has directed that Team Blade be used for survivability only, and task forces will be limited to hull-down positions or modified two-tier positions. The brigade engineer has determined that there is not sufficient time to prepare turret-down positions. This guidance serves to prioritize the survivability effort and efficiently use the blade hours allocated to the task force. LTC Stone has tasked his operations sergeant major with the mission of enforcing the timeline. Other task forces in the BCT use their CSM or master gunner to accomplish this mission. The A&O PL performs the same mission for his battalion commander. The A&O PL moves his blades to the contact point behind the first company battle position and links up with the company executive officer. Before the engineers' arrival, the XO has ensured that the corners of all proposed vehicle fighting positions have been marked with long pickets and that vehicles are available to proof the positions as they are completed. The tank commander for each vehicle is also available to supervise the construction of the position he will fight from and to guide the incoming blade teams to the proposed position.

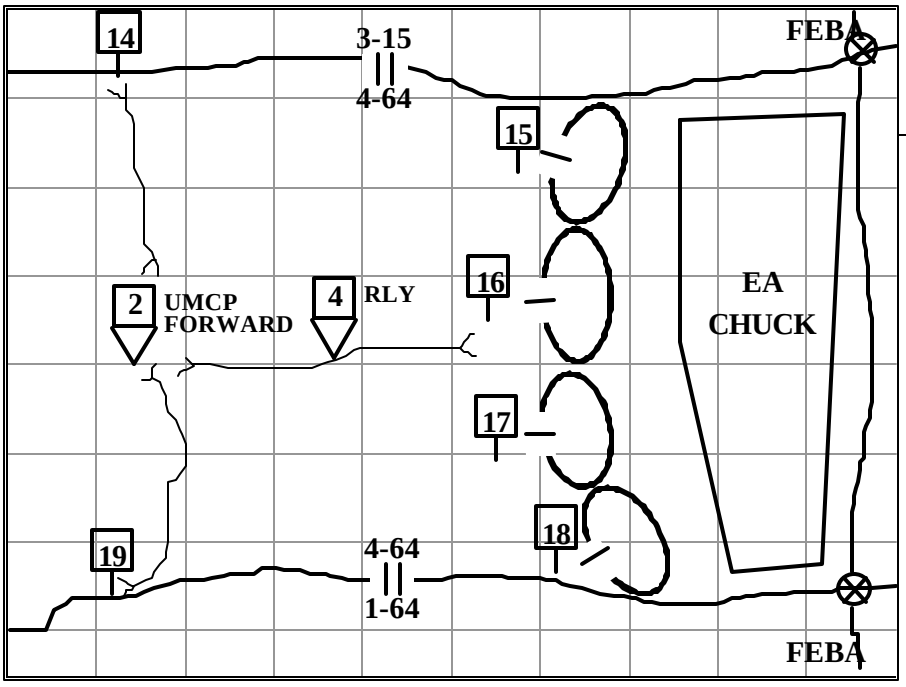


Figure 1. TF 4-64, the center TF in the BCT defense, with Team Blade graphic control measures

As the blades enter the company battle position, the A&O PL releases the SEEs to the infantry platoon leader to construct his dismounted fighting positions. If the company is armor pure and does not require individual fighting positions, the SEEs are moved to the next company team that does. The infantry PL understands the task force survivability timeline and a linkup time is agreed upon before the SEEs are released. The blade teams are assigned to the marked positions and digging begins. The A&O PL remains on the battle position to supervise the dig effort. He is responsible for the correct use of the blade assets, the conduct of hourly maintenance by his crews, survivability and maintenance status reporting, and adherence to the brigade and task force survivability timelines. His platoon sergeant performs these functions in his absence and is also responsible for feeding the crews on the battle position and escorting damaged vehicles back to the UMCP Forward. The Team Blade commander will typically escort a repaired vehicle from the UMCP Forward back to the dig site. The Team Blade commander is also responsible for all logistical support to the team. This includes feeding, fueling, fixing, and moving the team. The task force may be required to supplement this support, especially with fuel. The ACE requires fuel every five to six hours when digging, and this can stretch the capabilities of the engineer battalion's support platoon.

Paramount to the success of the team is the maintenance section. Organized with the battalion's engineer mechanics, a welder, at least one direct support mechanic, and maintenance team chief, the maintenance team uses one of the two M88 recovery vehicles in the battalion, the only battalion shop equipment truck and welding trailer, and one or two AVLB bridges as maintenance platforms. In some cases, the battalion will push forward an ULLS computer and clerk and a larger PLL inventory to better sustain the team. Even under the best of conditions, one or more M9 ACEs will be found in the UMCP forward. Designed as a breaching vehicle capable of keeping pace with the M1 and M2, the ACE requires constant maintenance attention when digging. As it was not designed to dig, this type of work places tremendous pressure on the vehicle's hydraulic and suspension system. ACE operators must actually stop digging and perform a series of preventive checks on the vehicle once an hour. Separate engineer company maintenance teams are not capable of providing this attention with the limited assets they have available. Separate engineer company dig efforts lead to higher deadline rates among the ACEs and thus slower completion time for company team defensive positions. A mechanized engineer battalion simply does not have the organic maintenance personnel, recovery assets, or specialized equipment to support three separate, simultaneous survivability missions.

As LTC Stone and his commanders return from their reconnaissance, his staff informs him that the survivability effort is now 25 percent complete. With three ACEs deadlined at the UMCP Forward, Team Dig has 18 ACEs and four attached D7 bulldozers operational. These vehicles have been paired up to create blade teams. While one vehicle digs the fighting position, the other spreads the spoil across the battle position to prevent the fighting position from being easily spotted.

As the blade teams dig, enemy artillery begins to impact less than three hundred meters to the front of the BP. Following a rehearsed battle drill, the blades occupy positions that are deep enough to cover them, and the rest move to a rally point designated by the A&O PL. In this case, he has chosen a point halfway between the BP and the UMCP Forward. If an enemy attack is imminent, all blades will withdraw to the rally point. Despite the massing of the brigade's blade assets on one BP, there is not a significant risk of the team being destroyed in a single artillery attack. With vehicle fighting positions spread across the BP, blade teams are never closer than a hundred meters from one another and in most cases they are at least two hundred meters apart.

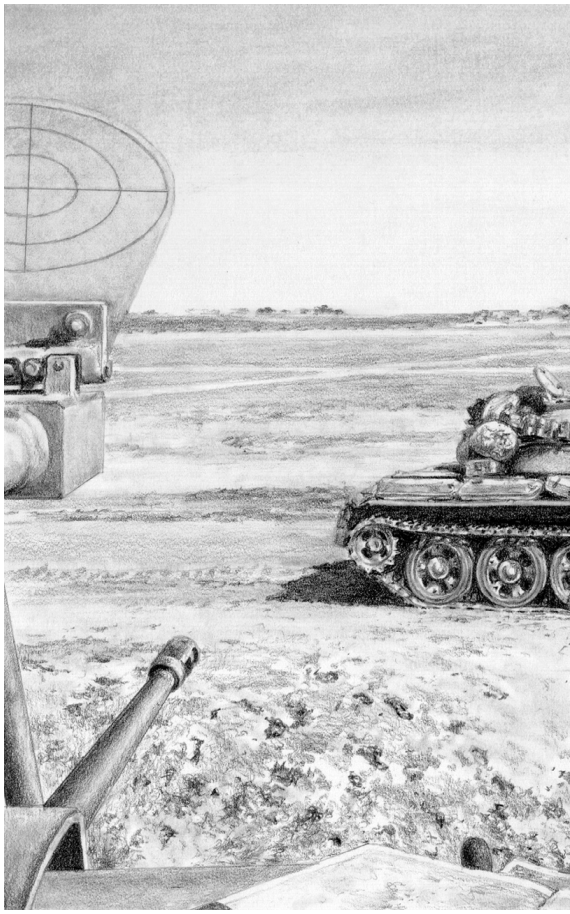
With the first company's battle position complete, the A&O PL moves his team to the next company contact point and the process begins again. Hours later, as the task force's survivability window comes to a close, Team Blade moves to the contact point at the task force boundary. Under the watchful eyes of the tank section providing security, the team is met by the CSM of the new task force and the Assault and Obstacle PL from the engineer company in sector.

LTC Stone again surveys his battle position. With vehicles, dismounts, and ammunition caches dug in, he is able to focus on the destruction of the coming counterattack. In the engagement area to his front, sappers continue to emplace obstacles. His company team commanders rehearse the occupation of their newly constructed fighting positions. Team Blade has been a success.

CPT Pete Huie served as a Combat Engineer platoon leader with the 3rd Engineer Battalion and as an Assault and Obstacle platoon leader and TAC Officer with the 10th Engineer Battalion in Fort Stewart, Ga. He is a graduate of the Armor Officer Advanced Course and the Engineer Officer Basic Course and is currently attending the Combined Arms and Services Staff School.

Incident at Safwan

by Stephen A. Bourque



The small Iraqi town and airfield of Safwan[1] occupies a special place in the history of the 1991 Persian Gulf War. The site of the peace talks that ended this short conflict, it represents the public triumph of America's Cold-War Army. At Safwan, the American military buried the ghost of Vietnam that had haunted the United States for over twenty years.

The village of Safwan also has a less well known meaning. The failure of ground forces to capture objectives in the Safwan area during the war prompted a major dispute between GEN H. Norman Schwarzkopf and his subordinate commanders, that went on to poison relations among senior leaders in the post-war era.[2] What is often lost in describing the generals' verbal battle, however, is the story of how American soldiers captured the airfield in preparation for the dramatic cease-fire negotiations.

"Safwan is not under our control."

In the early morning hours of 1 March 1991, the 1st Infantry Division's night operations officer had just settled down to what he anticipated would be a routine shift. The Big Red One's headquarters was on the Basra-Kuwait highway just west of the burning fires of Kuwait's Ar Rawdatayn oil field. The night sky had a red glow overlain with a constant roaring from the flaming wells. Troops did not need flashlights as they moved around in the night. MG Thomas G. Rhame, the division commander, and his principal staff officers had finally gone to bed after almost a week of operations that began on 23 February. *Danger Main's*[3] night shift began the routine task of general security, accounting for all soldiers and equipment, and planning for subsequent operations.

Shortly before 0200 hours, the VII Corps tactical operations center's duty officer called to ask if the 1st Division had the area around Safwan under control or observation. Since he had just confirmed the locations of all units in the division, the duty officer said no.[4] Suddenly, the town of Safwan had become extremely important. Over the next 18 hours, two commands from the 1st Infantry Division would confront Saddam Hussein's Army on Iraqi soil in an incident that threatened to reopen the just-concluded conflict.

On 28 February, GEN Powell had ordered GEN Schwarzkopf to conduct a cease-fire ceremony with the Iraqi High Command. Schwarzkopf wanted this site located deep in Iraq so it would be obvious to all who was the victor and who was the vanquished. He also wanted it at a location that the Iraqi delegation could reach by road.[5] He directed his Chief of Staff, MG Robert B. Johnston, to find the location. Around 2100 hours, Johnston called LTG Yeosock, who was at his command post on the other side of Riyadh, for site suggestions. Without contacting either of his corps commanders, who were familiar with the conditions on the ground, he suggested three possible locations: the village of Shaibah outside of al Basra; Jalibah airfield, about 80 miles west of al Basra; and a location across the Hawr al Hammar causeway.[6]

Since only one of these, Jalibah, was under American control, it was the only realistic choice.

After Yeosock passed on his suggestions, he ordered LTG Gary Luck and XVIII Corps to prepare the airfield for the ceremony. Later that night, Luck told him that Jalibah was not the site to use. It had been the target of a violent attack by the 24th Infantry Division on the morning of 27 February.[7] Unexploded munitions and damaged vehicles were everywhere, and it could not be cleaned up in time for the proposed meeting. LTG Yeosock now had to call the CinC and tell him to change his plans.[8]

Schwarzkopf had already sent a message describing his concept for the negotiations to GEN Powell. Now he had to call his message back and change the site of the talks. Looking at his map, he selected the airfield at Safwan as the alternate site and redrafted his message to the Joint Chiefs of Staff.[9] The airfield at Safwan was six kilometers west of the intersection near Safwan. Schwarzkopf had never ordered anyone to seize the airfield. Now it became an objective that should have been taken. Neither Schwarzkopf nor Yeosock called Franks ahead of time to ask him for his assessment of the location.

After the fact, later that night, BG Steve Arnold, the Third Army G3, asked COL Cherrie, the VII Corps G3, about using Safwan for the negotiations. Cherrie told him that it was on the other side of the demarcation line in enemy territory. It was the first the Corps G3 had heard of the airfield at Safwan, and he couldn't understand why the CinC had chosen that location.[10] Around 0130 hours, Yeosock called Franks himself and asked him about the status of the airfield near Safwan and told him about the upcoming conference.[11] A few minutes later, one of Cherrie's staff officers called the 1st Infantry Division's main command post.

For almost ten minutes the division's duty officer confirmed to several corps staff officers that no one in the 1st Infantry Division was near Safwan and that unit locations had not changed since the report he rendered at 1900 hours the previous evening.[12] Finally, an agitated LTG Franks had enough and grabbed the telephone from his staff officer. "Do you know who this is?" He shouted at the stunned divisional staff officer, "Get Rhame on the phone now!" Quickly, the duty officer raced out of the TOC and across 50 yards of fire-illuminated sand to wake his exhausted commander.[13]

MG Rhame, awaking from his first decent sleep in over a week, at first thought it was some kind of a joke. Throwing on his trousers and boots, he raced back to his command post that he had left only a couple of hours earlier. There, Franks was on the phone wanting to know about Safwan. In a few minutes, Rhame confirmed that Safwan was not under the control of his division and had never been an assigned objective.[14] By now, almost 45 minutes had gone by since that first call from the corps. Rhame finally asked, "What were his orders?" LTG Franks then gave Rhame a mission to reconnoiter the area around Safwan but not to get decisively engaged.[15]

Off the phone with the corps commander around 0240 hours, Rhame radioed his 1-4 Cavalry Squadron commander, LTC Bob Wilson.[16] Like other units in the 1st Infantry Division, the cavalry squadron had only a minimum number of soldiers awake and on-duty. For almost a month it had been on a war footing and few soldiers had been able to get any sleep over the previous four days.[17] Once Wilson was awake, Rhame told him to move as soon as possible to recon the area near Safwan.[18]

Franks, meanwhile, had second thoughts about this impromptu mission. At 0308 hours, he called Rhame back and ordered the 1st Infantry Division to stop its movement. At first light, he wanted Rhame to conduct an area reconnaissance to determine if the CinC could use the site as a meeting area. He was to find out if there were any enemy troops in the area, but not to get into a serious fight with Iraqi forces. Finally Franks, under pressure from Yeosock and Schwarzkopf, also asked him to run an "audit trail" on the mission. In other words, had the 1st Infantry Division received the order to seize Safwan crossroads? If so, why was it not accomplished? If not, why not?[19]

Schwarzkopf, by his own admission, came "completely unglued" when he found out that VII Corps had not taken Safwan. He shouted at Yeosock:

"I *ordered* you (italics are Schwarzkopf's) to send VII Corps to that road junction. I want to know *in writing* why my order was violated and why this mission was reported carried out when it wasn't."[20]

Given the scope of all that Yeosock and Franks had accomplished in the last few weeks, it was a demeaning exercise that seriously soured morale at the end of the war. Months after the conflict, Stan Cherrie remembered how irate he was as he read Franks' personally typed reply to Schwarzkopf. Here was a commander who had achieved all that had been asked, and now he was being accused of dishonesty.[21] Yeosock and Franks each shifted blame to no one, and each accepted full responsibility for unintentionally ignoring the details of the order.[22] Of course, the issue was not about seizing the *road junction*, but about an *airfield*. Schwarzkopf had never told Yeosock to seize the airfield.

VII Corps now had one last combat mission to perform. At 0350 hours, Franks called Rhame again, and laid out his mission for seizing Safwan. "Intent is to not take any casualties." The corps' log read, "If you run into enemy forces, then stop and report to CG VII Corps."[23] LTC Wilson's 1-4 Cavalry Squadron still had the mission. It was to move to and seize the airfield near Safwan and occupy it in preparation for the surrender ceremony. Rhame, passing along Franks' guidance, told him to avoid combat (and re-starting the war) if possible, but to defend himself

as appropriate. These orders, from Wilson's perspective, were just what he needed: clear senior commander's intent, maximum flexibility for the ground commander in an unclear situation, and no hint of the tension and politics taking place between division, corps and army headquarters.[24] Wilson had a fairly powerful force at his disposal, two tank-reinforced ground troops, two air cavalry troops, and an Apache attack helicopter company.[25]

Movement to Contact

Wilson moved out at 0615 hours with his two ground troops moving cross-country, north-north-east. The ground scouts moved quickly in standard traveling overwatch formation. With the Safwan Mountain (Jabal Sanam) as a guide, A Troop moved in the eastern and B Troop moved on the western sides of the zone.[26] Forward of each ground troop was an aerial scout-weapons team (SWT) consisting of OH-58 scout helicopters and Cobra attack helicopters. The AH-64 Apache company was kept on the ground at a holding area ready to respond if Wilson's troopers got into trouble.[27]

Rhame could tell Wilson little about the enemy situation. The 1st Infantry Division's Main Command Post had only recently reorganized after the ground offensive, and its G-2 (Intelligence) section was unable to provide the squadron with any information on the Iraqi's composition or disposition.[28] The aviation scouts, however, were soon reporting dozens of abandoned Iraqi army vehicles on the way to the airfield. Rhame ordered Wilson not to slow-down and destroy any of these vehicles so he could get to Safwan before the Iraqis could react.[29]

As the ground troops approached the mountain, around 0700 hours, A Troop swung to the east and B Troop moved to the west. The squadron had been expecting a large runway, but A Troop's soldiers crossed the narrow asphalt strip thinking they were on an unfinished four-lane highway. Initially it appeared deserted, but a few moments later, the air scouts discovered tanks and other vehicles in revetted positions on the northern side of the airfield, oriented towards the south and west. Behind the dug-in armor, the Iraqis positioned many more tracked and wheeled vehicles.[30] What the 1-4 Cavalry Squadron had found, defending about 1500 meters north of the airfield, was an entire Iraqi armored brigade. Three battalions were on line and an additional battalion positioned in depth. All of the Iraqi combat vehicles were in prepared positions.[31] Wilson reminded his commanders not to fire, unless fired upon or in danger,[32] but to continue in a steady advance on to the airfield. The troopers were nervous and some feared that they would be the first casualties in a renewal of the fighting. Courageously, they drove their combat vehicles within the range of the Iraqi weapon systems and occupied the airfield.[33]

With the cavalry squadron on the objective, Rhame ordered Wilson to move his air-scouts to the important road junction, about five miles east of Safwan Mountain. As the air cavalrymen continued to investigate, they found the area full of other Iraqi tank and mechanized units. As the squadron's scouts watched, hundreds of Iraqi vehicles continued to move north and away from the Americans.[34] The 1-4 Cavalry Squadron had obviously arrived at the southern boundary of the Basra pocket.

Around 0830 hours, LTC Wilson moved forward to the airfield, dismounted from his Bradley, and approached several "well-dressed and well-fed" Iraqi soldiers whose uniforms indicated that they were from a Republican Guard unit. Their equipment appeared in very good shape and Wilson noticed trucks with fresh vegetables and other supplies. Wilson then spoke, through an interpreter, with the senior officer at the site. He told the Iraqi colonel that the airfield at Safwan was under U.S. control and that he must move his men and equipment immediately. Obviously disturbed by Wilson's words, the Iraqi officer left to speak to his commander.[35]

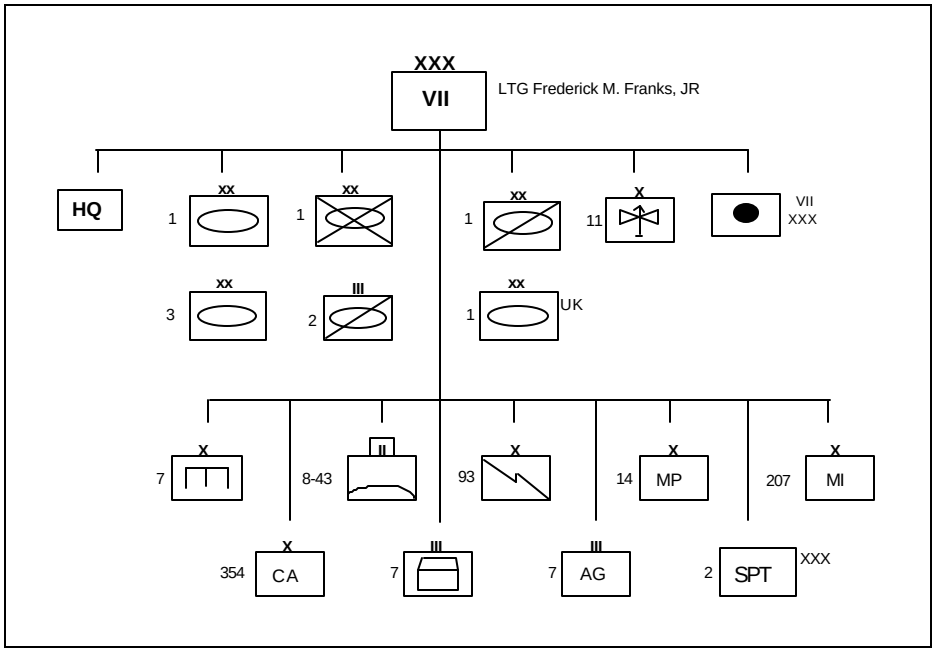


Fig. 1
U.S. VII Corps Organization as of February 1991.

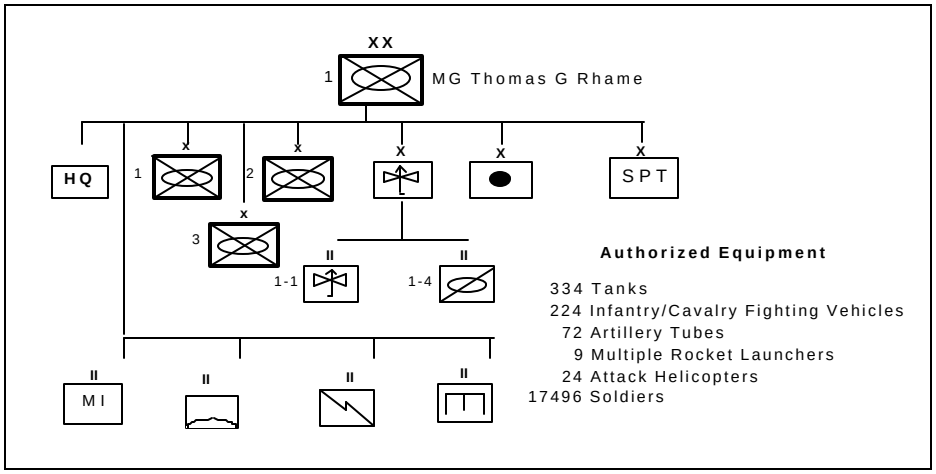


Fig. 2
Organization of the 1st Infantry Div. (Mech), February 1991

As the officer departed, four Iraqi tanks moved in front of Wilson's command group and lowered their gun tubes at it. The young squadron commander realized this was no time for bravado, and calmly pulled his group south 100 yards. He then alerted his troop commanders who were also negotiating with Iraqis at other portions of the airfield, and directed the Apache company to fly over his location in a show of force. Arriving a few moments later, the sight of the greatly feared attack helicopters caused a change in the Iraqi attitude as, almost immediately, the Iraqi tanks moved back. With the situation now clarified, Wilson, along with his boss COL Jim Mowery (1st Infantry Division's Aviation Brigade Commander), again moved forward to confront the Iraqi officers. An Iraqi colonel told Wilson that his general said they were to remain on the airfield. Wilson calmly replied that if they did not move out, the entire 1st Infantry Division would attack them within hours. Looking at the hovering Apache helicopters, the Iraqi officer said he needed to speak with his superior and departed.[36]

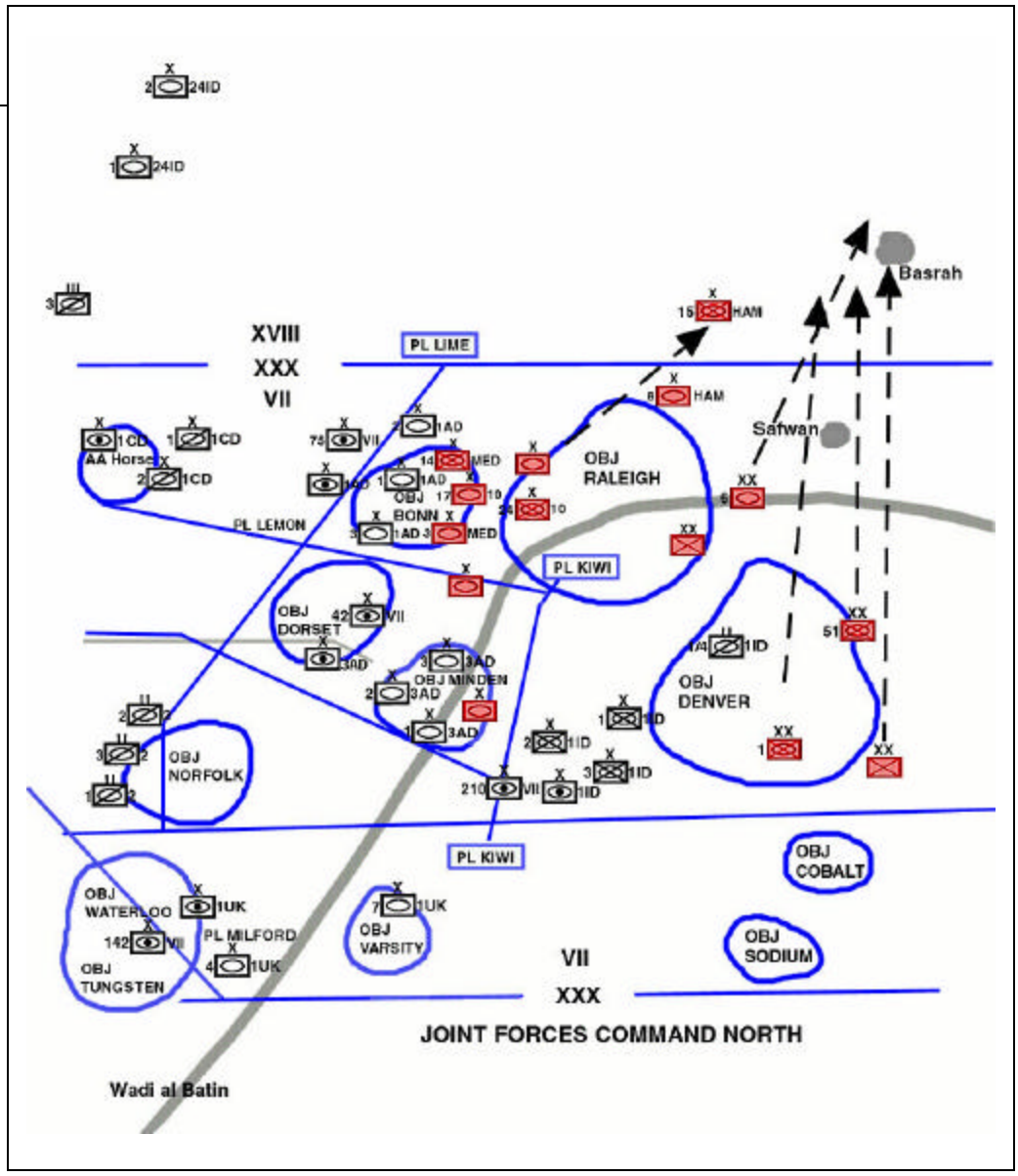


Fig. 3
Situation, 2300 hours, 27 February 1991

Similar situations were taking place in the two cavalry troop sectors. Not all the Iraqi soldiers were in as good shape as the troops Wilson encountered. In many cases the cavalrymen provided rations for obviously hungry Iraqi soldiers, many who came out of hiding and surrendered to the squadron's troopers. Just as they had done during the previous week, American troopers disarmed the Iraqis willing to surrender, gave them food, and sent them to the south towards the VII Corps' prisoner of war compounds.[37]

In the A Troop sector, about the same time that LTC Wilson was having his first encounter, an Iraqi Republican Guard colonel approached the American troops. He was angry that they were feeding his soldiers on his land. As a response, he directed his own men to brew up some tea for the troopers of A Troop. CPT Ken Pope, the A Troop commander told the Iraqi officer that they had to leave the area because of the upcoming peace talks. The two leaders exchanged map locations and the Iraqi colonel departed to confer with his superiors.[38] So far, the cavalrymen had accomplished their mission with skill. Their command discipline prevented a tense situation from turning into a needless firefight.

Rhame wasn't waiting for this situation to continue. Now that Wilson had accomplished his reconnaissance mission, he directed COL Tony Moreno's 2d Brigade, consisting of two tank battalions, a mechanized infantry battalion, and a field artillery battalion, to move into the sector. At 1009 hours the Dagger Brigade started to move toward Safwan. Rhame placed Wilson's cavalry squadron under the operational control of Moreno's brigade.[39]

At 1020 hours, the Iraqi colonel returned to A Troop and told its commander that he was not going to leave the airfield. Just at that moment, the now ubiquitous Apache attack helicopters flew overhead. Pope, knowing the terrifying reputation of these aircraft amongst the Iraqis, told the Iraqi colonel that if he didn't move, American forces would attack him. This Iraqi colonel, also, went back to find his superiors.[40]

In CPT Mike Bills' B Troop sector, a similar scenario played itself out. He and a detachment of combat vehicles moved towards the Iraqi defenses. Once close, the young captain dismounted and approached some soldiers asking to see their commander. Soon a lieutenant colonel arrived who, in broken English asked "Why are you in Iraq? Are you lost?"[41] Bills assured him that was not the case

and he was here to secure the site for the cease-fire negotiations. The Iraqi commander told his junior enlisted soldiers to leave and surrounded Bills with about 15 to 20 officers and senior soldiers. The Iraqi LTC then left to confer with his superiors. A short time later he returned with additional soldiers, wearing the black leather jackets, camouflage uniforms and berets of Iraqi commando units.[42] To Bills, the situation looked as though it had taken a turn for the worse.

However, after a short, tense stand-off, this Iraqi unit and all of the others on the airfield received orders from their superiors to leave. By 1200, the entire airfield complex was clear of Iraqi troops. BG William Carter, the 1st Infantry Division's Assistant Division Commander (Maneuver), flew to Wilson's location and told him that he was now under the approaching 2d Brigade's operational control.[43]

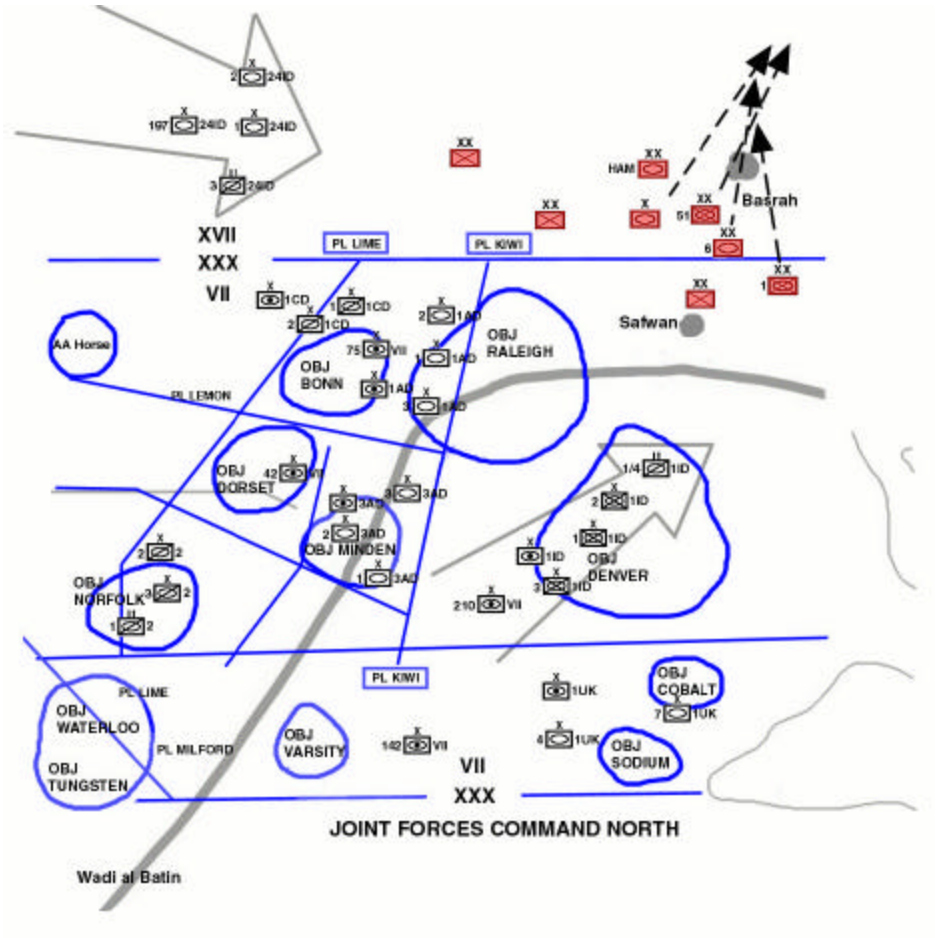


Fig. 4
Situation, 0800 Hours, 28 February 1991

The Roadblock

The stand-off wasn't over yet, however. While most of the 2d Brigade moved cross country, its supporting 4-5 Field Artillery Battalion moved directly up the Basra road. At the village of Safwan, an Iraqi infantry unit stopped it as it tried to move through the town. This unit was from Saddam Hussein's home town of Tikrit and had no intention of moving.[44] Around 1100 hours, COL Moreno arrived with armored reinforcements and asked to see the senior Iraqi officer. Soon a major arrived, but Moreno wanted a more senior officer. Soon a command car arrived with two generals and a civilian government official. Moreno calmly told the group that he was bringing his forces to Safwan for the peace negotiations and they had to stop blocking the road. The Iraqis didn't understand, and actually thought they had the Americans surrounded. Moreno demanded to see a more senior official.[45]

Meanwhile, LTG Yeosock was under increasing pressure from Schwarzkopf to get the area secured. After 1500 hours he called directly down to MG Rhame and told him the following:

(1) We must have the airfield.

(2) CinC ordered us to take it.

(3) Must show that we have wrecked the country to humiliate them. Must show knocked out buildings and equipment.

(4) Go into airfield at Safwan with overwhelming combat power.

(5) Force Iraqi units out.

(6) Use PSYOPS to convince them to leave. Invite them to surrender.

(7) If not, use combat power. If they fire, destroy them.

(8) Attempt to avoid contact. Request permission from CinC before committing to combat.[46]

Yeosock, under obvious pressure from Schwarzkopf, [47] was obfuscating the issue. Did he want Rhame to force the Iraqis out or not? These were garbled instructions that left the disposition of the problem to the commander on the ground. From the perspective of VII Corps and 1st Infantry Division officers, if something went wrong, Yeosock and Schwarzkopf would have a subordinate ready to sacrifice.

Ending the Impasse

Ultimately it didn't matter. Rhame, not known for being indecisive, had already decided to end the standoff. Ten minutes before Yeosock called, Rhame ordered Moreno to tell the Iraqis to move or die by 1600 hours.[48]

Tony Moreno was tired. The infantry colonel had been commanding from the confined quarters of his Bradley fighting vehicle for over a week. Both MG Rhame and BG Carter were at his headquarters providing all the supervision he needed. Once he received Rhame's instructions, he jumped at the chance to end the standoff. He deployed his forces for an overwhelming display of combat power, moving the 1-4 Cavalry now un-

der his operational control, and his other three battalions to surround the airfield and the town around 1500 hours. He drove his M2 Bradley right up to the recently arrived Iraqi delegation. On his way out of the vehicle, Moreno hit his mouth on its hard metal, causing his lip to bleed. As the somewhat intimidated Iraqi delegation began reading a statement, Moreno cut them off.

Spitting a wad of blood at the feet of the surprised Iraqis, the stocky Hawaiian pointed his finger and said "If you don't leave by 1600 hours, we will kill you."[49] Just at that moment a tank battalion arrived to add emphasis to Moreno's threat. Tanks moved right up to the enemy command vehicle as the Iraqi officers looked on, horrified. Moreno, again, told them to move. The Iraqi commander requested some more time, and Moreno consented, but emphasized that at 1630 hours, "I'm coming through."[50]

The Iraqi general left to get his soldiers moving out of the area. A short while later he reappeared and thanked COL Moreno for not killing his soldiers. Then he asked if he could leave some of his tanks to help secure the negotiation area. An amazed Moreno told him no and drew him a map of where he should move his soldiers to. "Anything within three kilometers of that box when the sun rises we will kill." The Iraqi general nodded in agreement and departed.[51]

Conclusions

The Iraqi units soon left and the 1st Infantry Division began preparing the site for the negotiations. Rhame, Moreno, and Wilson had pulled off a demanding mission without a loss. In his memoirs, Schwarzkopf says his threat to use force was "bluffing."[52] Yeosock is much more candid, and was concerned that Safwan could have become a place the Iraqis chose to stand and die, forcing the Americans to violate the cease-fire on Iraqi soil.[53]

What does this minor incident about an obscure crossroads in the Iraqi desert say about the U.S. Army at the end of the cold war? At the tactical level, the Safwan incident shows the folly of relying on only high-technological solutions. Soldiers on the ground, backed by conventional firepower and attack helicopters under the control of the ground commander, convinced the Iraqi soldiers to leave without a fight. The result was no bloodshed on either side and an acceptable site for peace negotiations. No amount of high-tech weaponry could have attained that political objective.

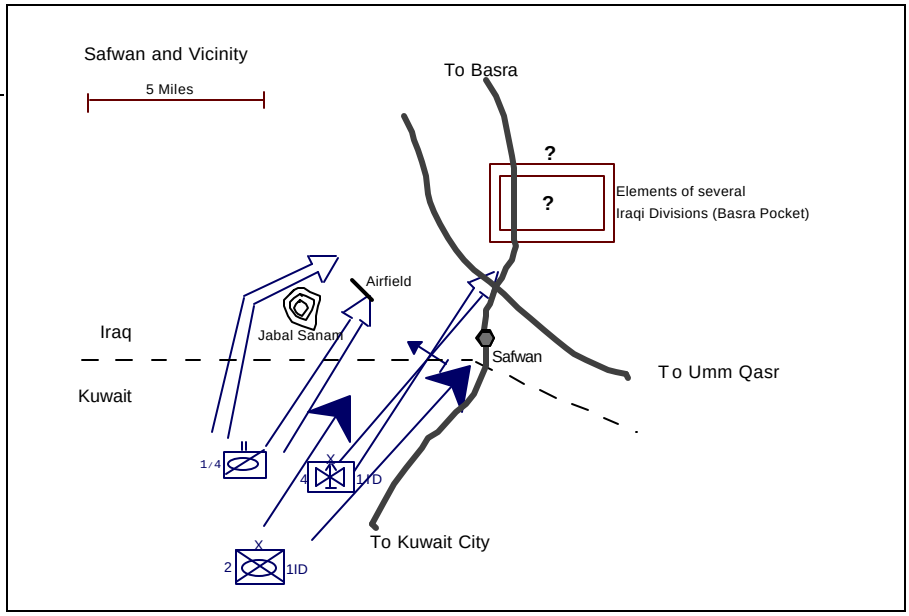


Fig. 5

1st Infantry Division units move to secure Safwan Airfield, 1 March 1991.

The Safwan incident highlights the effect of personalities on the conduct of war. The tactical chain of command was based on clear bonds of trust and mutual admiration. Six years after the incident, Bob Wilson still had nothing but praise for Rhame's clear general orders on seizing Safwan. In their interviews after the war, Rhame and Cherrie often spoke of how they trusted and believed in General Franks' leadership.

The incident at Safwan, therefore, presents the victorious Gulf War Army in a different light than seen by the public in 1991. Safwan refutes the image of the perfectly executed, clean, "high-tech," military operation most Americans believe took place in the winter of 1991. It was conclusive proof that the strength of the Army rested on the shoulders of its officers, noncommissioned officers, and individual soldiers.

Notes

[1]This article benefited from assistance and advice from many people, both military and civilian, who helped to make this story as accurate as possible. Of special note are LTC (Ret.) John Burdan, BG Bob Wilson, COL Mike Kendall, COL(Ret.) Rick Swain, LTG Tom Rhame, BG Stan Cherrie, COL Dave Gross, and Dr. Susan Canedy. Versions of this paper were presented before the Association of Georgia State University Historians and the 1997 Ohio Valley History Conference.

[2]Tom Donnelly was the first to publicly address the tensions between General Schwarzkopf and his subordinate commanders at Safwan in his article "The Generals' War," *Army Times*, 2 March, 1992, p. 8. Schwarzkopf added fuel to the fire by his own brutal account of his dispute with Yeosock and Franks in his autobiography, written with Peter Petre, *It Doesn't Take a Hero* (New York: Bantam Books, 1992), 550-551. Rick Atkinson, *Crusade* (Boston: Houghton Mifflin, 1993) and Robert Scales, *Certain Victory* (Washington, D.C.: GPO 1993) generally ignore the entire controversy. Michael R. Gordon and LTG Bernard E. Trainor, *The Generals' War* (Boston: Little, Brown and Company, 1995), 438-443, continued to stir up this controversy without any serious analysis of its causes. The best account of the causes of the controversy is found in Richard M. Swain, *"Lucky War" Third Army in Desert Storm* (Fort Leavenworth, Kan.: U.S. Command and General Staff College Press), 1994. General Franks' perspective on the Safwan controversy is found in Tom Clancy and GEN Fred Franks, Jr., *Into the Storm: A Study in Command* (New York: G.P. Putnam's Sons, 1996), 445-460.

[3]Nickname for the division's main command post.

[4]Author's notes, 28 February-1 March 1991. During this period the author was a member of the 1st Infantry Division's G3 Operations Staff.

[5]Schwarzkopf, It Doesn't Take a Hero, 549.

[6]Richard M. Swain, *"Lucky War:" Third Army in Desert Storm*, 293; and Yeosock Interview, 29 June 1991.

[7]Jason K. Kamiya, A History of the 24th Mechanized Infantry Division Combat Team During Operation Desert Storm (Fort Stewart, Ga.: 24th Infantry Division (Mechanized), 1992), 29.

[8]GEN John Yeosock and COL Richard M. Swain, "Interview with GEN John Yeosock," 27 June 1991.

[9]Schwarzkopf, *It Doesn't Take a Hero*, 549-550.

[10]Cherrie Interview, 12 September 1991.

[11]VII Corps Tactical Operations Center (TAC), Staff Journal, 1 March 1991, entry 3.

[12]1st Infantry Division TAC, Staff Journal, 28 February 1991, entry 83.

[13]Author's notes, 28 February-1 March 1991.

[14]Rhame Interview, 26 July 1991; and VII Corps TAC, Staff Journal, 1 March 1991, entry 3.

[15]VII Corps TAC, Staff Journal, 1 March 1991, entry 3.

[16]Author's notes; and 1-4 Cavalry Operations Staff, "Riders on the Storm," *ARMOR* (May 1991), 19. This article is a published version of the squadron's formal after-action report.

[17]Stephen A. Bourque, "Desert Saber: The VII Corps in the Gulf War" (Ph.D. diss. Georgia State University, 1996), 215-228. The 1-4 Cavalry Squadron began screening the 1st Infantry Division's attack sector on 3 February. It had been on a war-footing, therefore, for over four weeks.

[18]LTC John Burdan to author, 19 March 1997. Burdan was the operations officer (S-3) during this period. 1-4 Cavalry Operations Staff, "Riders on the Storm," 19.

[19]VII Corps TAC, Staff Journal, 1 March 1991, entry 3.

[20]Schwarzkopf, *It Doesn't Take a Hero*, 550-551.

[21]Cherrie Interview, 12 September 1991.

[22]Franks sent a letter to GEN Schwarzkopf conveying this message: Cherrie interview, 12 September 1991; and Clancy and Franks, *Into the Storm*, 456. Yeosock, according to his assistant LTC Mike Kendall, did the same: Kendall, note to author, 18 September 1997.

[23]VII Corps TAC, Staff Journal, 1 March 1991, entry 6.

[24]BG Bob Wilson, "Some comments ref. Safwan," Memo to author, 8 May 1997, 1.

[25]1-4 Cavalry Operations Staff, "Riders on the Storm," 19.

[26]Wilson, 8 May 1997, 2; Burdan, 19 Mar 97.

[27]1-4 Cavalry Operations Staff, "Riders on the Storm," 19.

[28]Burdan, 19 March 1997 and author's notes.

[29]1st Infantry Division Main Command Post (G3 Operations), 1 March 1991, entry 8; and, 1-4 Cavalry Operations Staff, "Riders on the Storm," 19.

[30]Burdan, 19 March 1997.

[31]1st Infantry Division Main Command Post (G3 Operations), Staff Journal, 1 March 1991, entries 9-14, 46; and 1-4 Cavalry Operations Staff, "Riders on the Storm," 19; and Rhame Interview, 26 July 1991.

[32]BG Bob Wilson, Note to author, 10 Jul 97.

[33]Burdan, 19 March 1997.

[34]1st Infantry Division Main Command Post (G3 Operations), Staff Journal, 1 March 1991, entries 15-30.

[35]Wilson, 8 May 1997, 2-3.

[36]Wilson, 8 May 1997, 3-4.

[37]Burdan, 19 March 1997.

[38]1st Infantry Division Main Command Post (G3 Operations), Staff Journal, 1 Mar 91, entries 31, 36 and 40; and 1-4 Cavalry Operations Staff, "Riders on the Storm," 20; and Rhame Interview, 26 Jul 91, and Burdan, 19 Mar 97.

[39]1st Infantry Division Main Command Post (G3 Operations), Staff Journal, 1 March 1991, entry 43; and Rhame Interview, 26 July 1991.

[40]1-4 Cavalry Operations Staff, "Riders on the Storm," 20; and Swain, *"Lucky War:" Third Army in Desert Storm*, 297.

[41]1-4 Cavalry Operations Staff, "Riders on the Storm," 20.

[42]Ibid.

[43]Wilson, 8 May 1997, 4-5.

[44]1st Infantry Division Main Command Post (G3 Operations), Staff Journal, 1 March 1991, entry 46; and Swain, *"Lucky War:" Third Army in Desert Storm*, 297.

[45]Jim Tice, "Coming Through: The Big Red One Raid," *Army Times* (26 Aug. 1991), 18; and 1st Infantry Division Tactical Operations Center (TAC), Staff Journal, 1 March 1991, entries 29, 30.

[46]VII Corps TAC, Staff Journal, 1 March 1991, entries 25, 33.

[47]Colonel Mike Kendall, Note to author, 15 July 1991.

[48]Rhame Interview, 26 July 1991.

[49]Ibid.

[50]Tice, "Coming Through," 18.

[51]Ibid.

[52]Schwarzkopf, *It Doesn't Take a Hero*, 552-553.

[53]Yeosock Interview, 29 June 1991.

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Cadet Troop Leader Training

by The Office of the Chief of Armor

Cadet Troop Leader Training (CTLT) is one of the most valuable tools the Military Academy and ROTC have to prepare future second lieutenants for life in the Army. Cadets live with active TO&E units and learn what life is like in the environment they will soon be joining, a perspective that cannot be duplicated at the college campus, the academy, or at a relatively structured summer camp.

Over the last two years, there has been a trend in the number of units that elect to host cadets during the summer. With ROTC cadets being added to the summer Mounted Maneuver Training that the West Point cadets get at Fort Knox, there has been a rise in the number of cadets who want to go to Armor CTLT.

At the same time, a lot of good units doing good training have declined to host cadets for the summer. This is a mistake; this is a great chance for the Armor Force to give those who will be platoon leaders in just over a year a unique introduction to the ways of the Army.

Most important is the need for the cadets to get as much time in the field as possible and as much independent interaction with soldiers as possible. This is the best way for a young cadet to spend his summer. Division G3s should try to get cadets into units that are going to gunnery or FTXs, but recovery after they have returned from the field can be great training, too. We want cadets to go to units that are "busy," in any capacity.

Cadets will not break. Cadets need a chance to operate without a safety net. Company commanders should give cadets a chance to succeed or fail at a mission. They are ready to be thrown into a position where you have given them a mission, your guidance, and a suspense. While the cadet is there is a great time to send platoon leaders to on-post schools or allow them to work something away from the platoon. The platoon sergeant is there. Cadets need time to work with soldiers and noncommissioned officers, to listen and to learn from their experiences.

Cadets arrive at your units with basic military training on land navigation, first aid, basic infantry weapons familiarization, basic individual training, small unit training, squad tactics, survival, and drill and ceremony. Some cadets have had training on infantry platoon tactics, tank platoon tactics, patrolling, communications, NBC, tactical intelligence, basic rifle marksmanship, and physical training. They have also received familiarization training in cavalry and armor, air defense, field artillery, and combat engineers. The cadets arrive fully capable of teaching classes on a range of military topics if they are given adequate preparation time and reference materials.

Brigade and battalion commanders, take advantage of this resource. It benefits both the unit and the cadets that, in the future, will be in your units as second lieutenants. Individual G3s should coordinate with West Point and ROTC to determine the number of cadets that units will host. Notify your G3 that you would like to host cadets this summer.

Again, remember that cadets don't break. This is a chance for them to learn, and it's your opportunity to influence the branch choice of the future leaders of the Armor Force.

Achieving Effective AC/RC Relations: An NTC Model for Success

by Lieutenant Colonel Aaron R. Kenneston

One hundred years ago, the Spanish-American War brought to light the need to reform active and reserve component relations in America's Army. Although our Army decisively defeated the Spanish defenders in Cuba, there was a great disparity in the ability of units to accomplish their missions. This was especially evident in active and reserve component performance.[1] Prior to this war, National Guard training consisted mainly of close order drill and marching. Each state had its own training standards and, based upon available funds, provided its own equipment.[2] To compound this problem, Active and National Guard units seldom trained together.

In sharp contrast is today's highly successful training relationship between the 11th Armored Cavalry (Blackhorse) Regiment and Nevada's 1/221st Cavalry (Wildhorse) Squadron. The validity of this partnership was demonstrated during two active duty NTC rotations this year, when the Wildhorse fought alongside the Blackhorse in January during Rotation 98-04 (*see ARMOR, May-June 1998*) and again in August during Rotation 98-10. In both rotations, the 1st Squadron, 221st Cavalry assumed its OPFOR identity as the 60th Guards Independent Tank Battalion, and fought under the control of the 125th Guards Tank Regiment (the 11th ACR) to defend the fictitious nation of Krasnovia against a visiting active Army brigade combat team.

An effective AC/RC relationship, like that of the 11th ACR and the 1/221st Cavalry, is built on mutual trust and support. Developing mutual trust requires both time and patience. It is created through frequent training exercises, compatible equipment, and a common training strategy. Of course, in an AC/RC relationship the support must also be mutual. To be highly successful, the partnership must increase the proficiency of the reservists, while materially enhancing the active unit's warfighting ability.

Units participating in the Spanish-American War clearly did not have the mutual trust and support necessary for effective relations. Upon outbreak of the hostilities, the Army Ordnance Department limited the issue of modern rifles to the Regular Army. The Reserve units participating in this conflict, with the exception of the Rough Riders, were armed with obsolete Springfield .45-70 single-shot black powder rifles. When the expeditionary force commander made the unfortunate decision to place a National Guard unit in the lead as our Army approached the open meadow below San Juan Hill, the unit's weapons were not only ineffectual, but their smoke revealed the exact location of the riflemen. This brought the concentrated fire of the enemy directly to bear upon the approaching column. The Spanish were armed with the then-state-of-the-art bolt action Mauser Model 1893, firing a smokeless, modern 7mm cartridge. Their withering fire caused the green Guard soldiers to go to ground and obstructed the attack's forward movement.[3]

Of course, there were other factors besides the reserve component's poor training, inferior equipment, and improper employment that affected our Army's performance. But, the war certainly highlighted the inadequacy of AC/RC relations. Our country discovered that the Revolutionary-era ideal of a very small standing army, supplemented with independent state-trained reserves, was not realistic in the 20th century. The Army's overall performance caused the Secretary of War to create a General Staff, reorganize the War Department, and reform the National Guard. Active and National Guard units began routinely to conduct joint maneuvers, be issued the same type of equipment, as well as use common training standards and methods. Thus, the war marked the very beginnings of effective integration of the RC into America's Army.[4]

In the hundred years since this watershed event, our Army has experienced both successes and failures while pursuing the ideal of seamless AC/RC integration. As we near the end of this century, one unit stands out as a model of the Army Chief of Staff's "one team, one fight, one future." This unit is the storied 11th Armored Cavalry Regiment. Tasked with providing a world class Opposing Force at the National Training Center, the 11th ACR has aggressively pursued the full integration of its three FORSCOM-authorized round-out units. Nevada's 1st Squadron, 221st Cavalry, has recently been joined by Arizona's 1st Battalion, 180th Field Artillery (Thunderhorse), and will soon be joined by a recently re-stationed cavalry troop in Montana.

The success of the unique Blackhorse/Wildhorse relationship is strengthened by three lessons that our Army learned from its experiences in the Spanish-American War. First, the Wildhorse conducts regular joint maneuvers with the Blackhorse. There is no peacetime equivalent to the realistic experience of the MILES battlefield at the NTC. Second,

the 1/221st Cavalry has equipment on a par with its active duty counterpart. The visually modified M113A3, HMMWV, and M1A1 (BMP, BRDM, and Krasnovian Variant Tank) are reliable, modern combat vehicles. Third, the training in the 11th ACR and its round-out units uses a standardized training strategy. All training follows the proven "8-step training model"[5] as directed by the commander of the National Training Center. Here is how the 8-step model was used to attain success in the six months between Rotation 98-04 and Rotation 98-10:

Step One. Immediately following the after-action review (AAR) of January's Rotation 98-04, the staff began to develop the plan for Rotation 98-10. While the squadron did not know the exact details of the missions that it would perform during its next NTC rotation, it could make certain assumptions, based upon the doctrinal employment of an independent tank battalion. After assessing the squadron's past performance, the plan was to focus on three major areas: the lethality of individual tank crews, the survivability of reconnaissance assets, and the synchronization of squadron combat power. The squadron scheduled and conducted planning sessions with the regiment and fellow active duty squadrons. Wildhorse staff officers also participated in a series of wargaming sessions. Several potential scenarios were discussed based on probable enemy courses of action. Then, general concepts for employment of the 1/221st Cavalry were developed.

Step Two. After initial planning, the squadron began to train and certify leaders. The centerpiece of this training is OPFOR tank commander certification. This process is similar to BLUEFOR tank tactical tables. Conducted over a drill weekend, this training is designed to validate a tank crew's ability to meet OPFOR standards on the battlefield. The certification process consists of 11 tasks modeled after the Blackhorse crew validation program.[6] The process begins with structured PMCS, PCI, and MILES operational checks. Then, the tank commander maneuvers his tank along a prescribed route and encounters an anti-armor team, enemy tanks, FASCAM, and a wire/mine obstacle. The TC must navigate from operational graphics, employ all tank weapons systems, conduct hasty breaches, report to a higher headquarters, and call for fire. Limited visibility operations are also included to enhance the squadron's night fighting capabilities. A tank crew evaluator accompanies the tank and rates the TC based on the standards in the Motorized Rifle Company Handbook. This exercise ensures that leaders have the confidence and basic competencies necessary to lead their troops on the MILES battlefield. Additionally, Wildhorse leaders participated in the regiment's officer professional development classes, which focused on how to defeat BLUEFOR command, control, communications, computer, intelligence, surveillance, and reconnaissance (C4ISR) capabilities.

1/221 Armor's "Krasnovian Variant" of the M1A1 tank on the move.

Step Three. Prior to NTC Rotation 98-10, a detailed reconnaissance of the training site was conducted. Officers and key NCOs spent a full drill weekend at the NTC participating in a tactical exercise without troops (TEWT) to gain a greater terrain appreciation and discuss OPFOR battle drills on the ground where they would be executed. The Wildhorse leaders maneuvered in HMMWVs throughout the training area with the regiment providing a motorized rifle battalion commander to facilitate this process. He discussed detailed tactics, techniques, and procedures, covering topics that ranged from potential enemy aerial battle positions to critical intervisibility lines. When the Wildhorse was not actually in the field, its soldiers were taking classes on navigation techniques and reporting procedures.

The regiment also provided a comprehensive intelligence summary of the BLUEFOR. The squadron leadership carefully studied the known capabilities of their opponents, the newly digitized 4th Brigade of the 4th Infantry Division, from Fort Hood, Texas.

Step Four. The next step was for the squadron to issue the training plan to subordinate troops at the monthly command and staff meeting. This meeting is conducted on a Tuesday night two weeks prior to drill, and looks out 180 days. The squadron commander gives his vision for the 180-day training plan. The S3 staff provides courses of action to the SCO for 150-day training. The troop commanders then brief the SCO on their 120-day training plans. Once approved, the SCO signs their training schedules. The troop first sergeants then address issues by exception for the 90-day and 60-day training events, while the squadron executive officer records issues for the staff to resolve. They then conduct a final "sanity check" of the upcoming 30-day training. From January's 180-day guidance to July's 30-day review, the training plans for NTC Rotation 98-10 were refined and communicated to the Wildhorse troopers.

Step Five. Next came rehearsal of the training plan at squadron, troop, and individual vehicle-level. As has become tradition in the Wildhorse, every vehicle commander, each with a map containing full operational graphics, participates in a squadron-level rehearsal on a giant sandtable. These rehearsals culminate in a full-up squadron-level meeting battle at the NTC utilizing MILES equipment. Our unit, the 60th Guards ITB, sparred with the free-thinking, uncooperative 4th MRB of the 125th Guards Tank Regiment in the Central Corridor one day prior to the regiment's actual attack on a visiting BLUEFOR unit. This was a "win-win" event for both the Blackhorse and the Wildhorse. Every member of the squadron team, from supply sergeant to mechanic to scout, was totally focused and committed to performing tasks to standard. The 1/221st Cavalry gained invaluable experience, while elements of the regiment were able to practice critical tasks prior to Training Day 01 of NTC Rotation 98-08. The 11th ACR provided "Blackhorse Brothers" to critique performance and provide troop/squadron after-action reviews. Lessons learned from the rehearsal were folded into final preparations for the upcoming rotation.

Step Six. When the time arrived to deploy for NTC Rotation 98-10, each trooper and the squadron had the confidence which comes with solid training and thorough preparation.

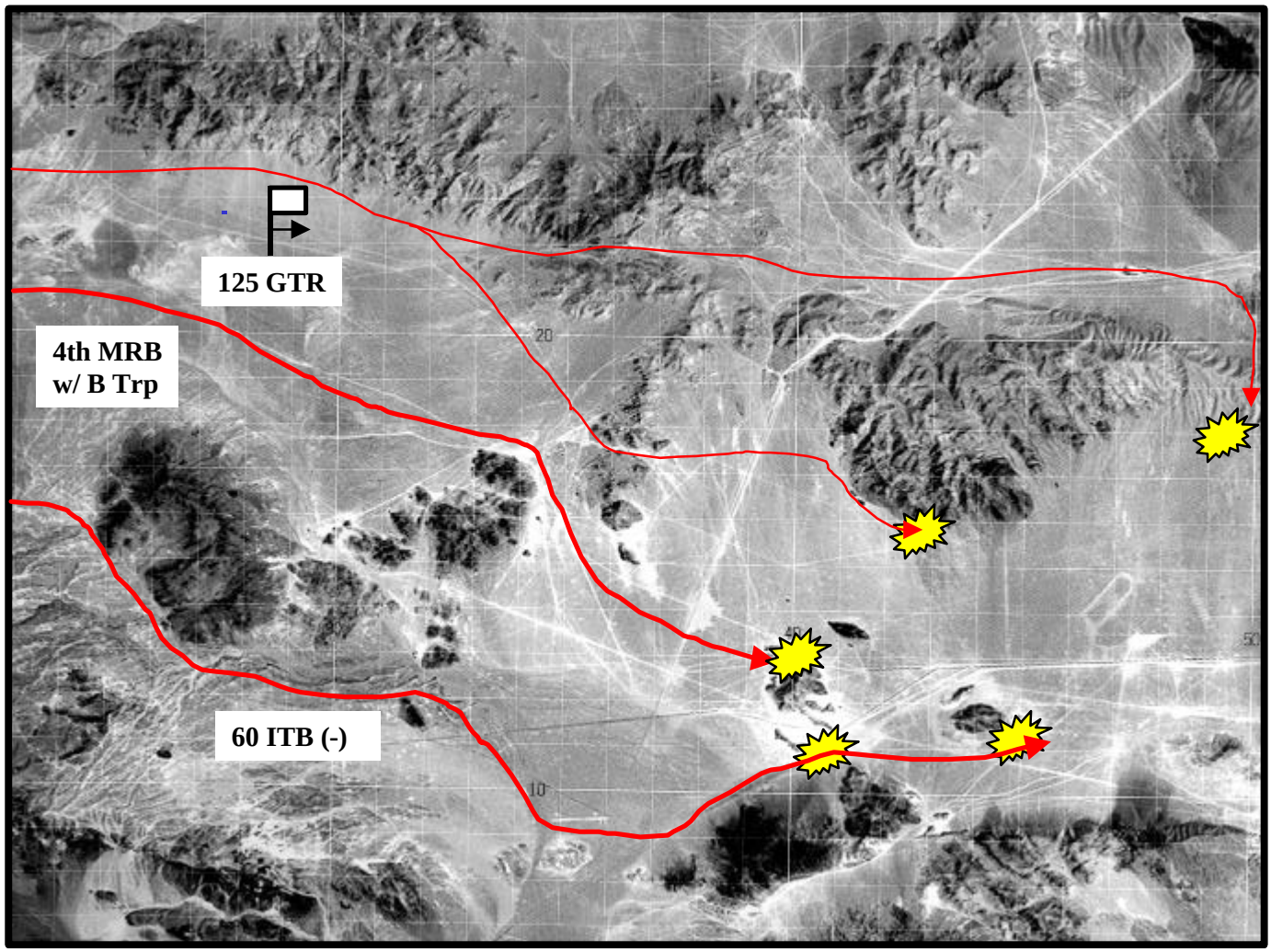


Fig. 1. MRR Meeting Battle (60th Guards ITB as Second Echelon)

The regiment provided a liaison officer to facilitate communications with higher headquarters. Nevada senior leadership provided technical support, such as environmentalists and DS-level mechanics, to ensure that Wildhorse troopers could focus entirely on the task at hand. Even Arizona's 1-180th FA (Thunderhorse) battalion contributed by providing about a dozen qualified forward observers to assist in the fight.

During the first battle of the rotation (*see Figure 1*), Bravo Troop was attached to the 4th MRB as part of the Forward Security Element in a regimental meeting battle. When the FSE made contact with the BLUEFOR, B Troop set a firing line and was able to fix and destroy numerous Bradleys and M1 tanks. The effect of concentrated volley fire was stunning. The only radio transmission received at the 60th Guards ITB command post during this engagement was "Send more ammunition!" Next, the 60th ITB (-) swung into action as the 125th GTR's second echelon, and was given a unique deception mission. Because of the exceptional ability of the 4th ID to see the battlefield with their UAV, digitized equipment, and helicopters, the 60th ITB was tasked with helping to overload their sensors. Combat Reconnaissance Patrols (CRP) moved along a southern route creating smoke and dust, which created the illusion of a large southern force, while the 125th GTR attacked in the north. Once the regimental commander called for the commitment of the second echelon, the 60th ITB moved along the same southern route that the CRPs had cleared. By combining a known safe route with additional obscuration, the 60th ITB moved unimpeded into the fray. An Apache helicopter, as well as a few M1 tanks and Bradleys, were destroyed as the 60th Guards ITB exploited the regiment's success.

The second battle proved to be a graduate-level tactical exercise for the citizen-soldiers of the 60th Guards ITB (*see Figure 2*). This time the regiment conducted a penetration attack. Attacking with three battalions abreast, the 125th GTR again attempted to overload the BLUEFOR's formidable intelligence assets. The 60th ITB used speed and obscuration to move along the regiment's southern flank. The CRPs employed smoke and stealth, and were able to overwhelm a sophisticated BLUEFOR observation and listening post. With this key terrain secured, the 60th ITB's Forward Security Element was able to bound to the southern wall of the central corridor. The main body then maneuvered into terrain known as Hidden Valley. The FSE was able to breach a tank ditch, two wire/mine obstacles, and rout a cavalry troop in the defense. Concurrently, the main body engaged and destroyed two Apaches and pushed three more out of the valley. With the helicopter threat neutralized, the main body was able to overwhelm the remaining M1/M2 opposition and secure the east mouth of Hidden Valley. The 60th ITB had now "set the L" on the remaining defenders of Hill 780.

While the main body provided suppressive fires on Hill 780, the FSE maneuvered and secured the hill. The 60th ITB then assumed a hasty defense on Hill 780 and along an IV line located near the east mouth of Hidden Valley. The Wildhorse had accomplished its mission! Several M1 tanks and Bradleys located on Hill 760 attempted to retake Hill 780, but their counterattack failed.

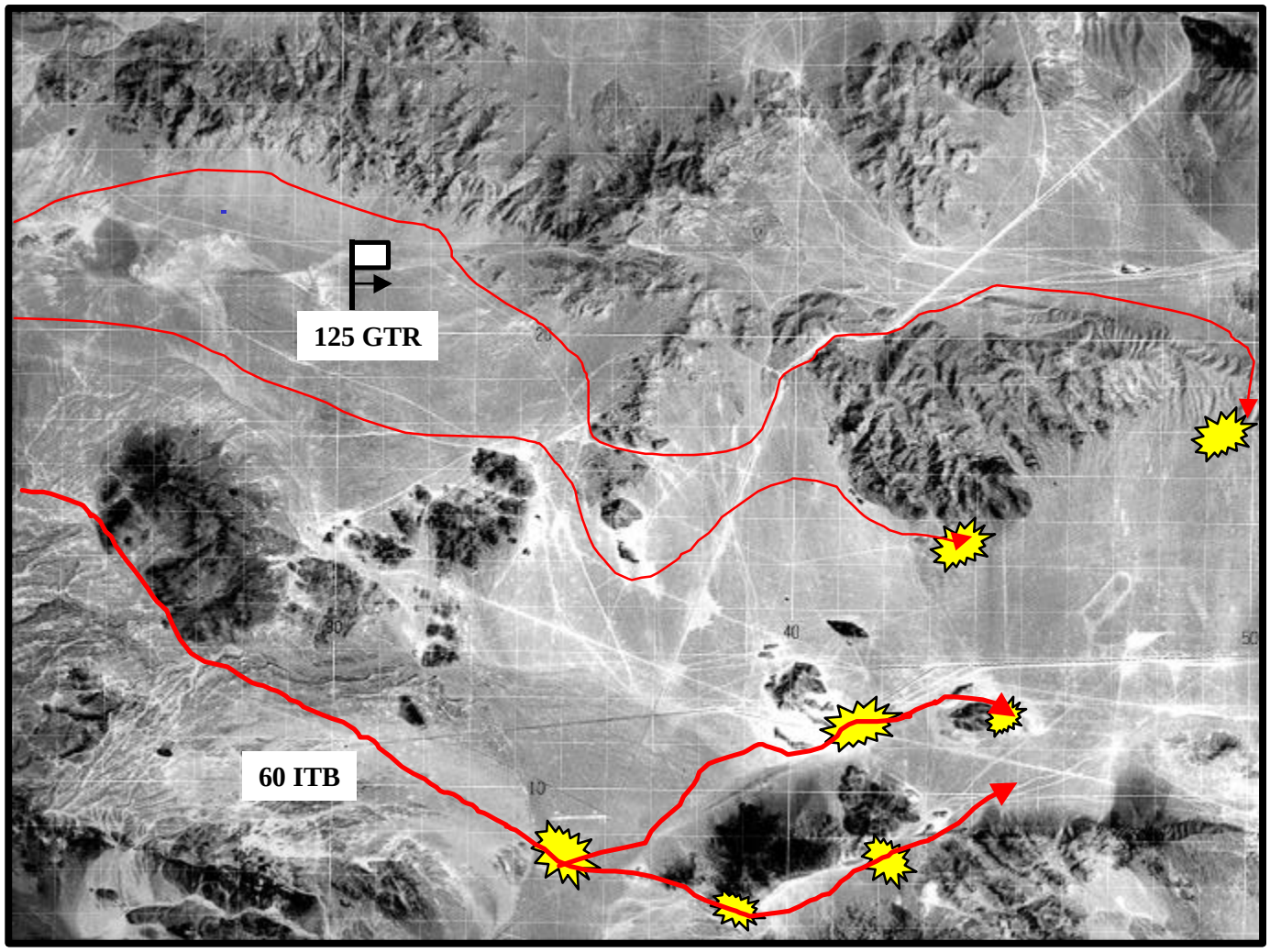


Fig. 2. MRR Penetration (60th Guards ITB as Enveloping Detachment)

The squadron morale was high after participating in these two battles. In a testimony to the determination and perseverance of Krasnovia's unsung heroes; the truck drivers, medics, cooks, supply personnel, and mechanics had worked at an amazing pace to ensure that all combat power crossed the line of departure for every battle. COL John D. Rosenberger, 58th Colonel of the Regiment, told the troopers of the 1/221st Cavalry: "I'm proud to serve with you and count you as members of this great fighting regiment, a team of teams. You should be proud of yourselves. You came ready to fight; you accomplished your missions with distinction; you took good care of each other. You upheld the heritage and traditional performance of the Blackhorse Regiment. There are no finer compliments, and you earned them all. Allons!"

Step Seven. The euphoria of the battles soon faded as the squadron began to conduct AARs. Under the critical eyes of the regimental S3 shop, the Wildhorse participated in brutally honest self-assessment. Troopers at all echelons discussed lessons learned. Performance was examined at the individual, collective, and leader levels. They also updated troop and squadron METLs.

The squadron's hard work had indeed improved the lethality of its tank crews, the survivability of its reconnaissance assets, and the synchronization of its combat power. However, additional items were identified that needed to be improved at the squadron level, including timeliness of information, both to subordinates and higher headquarters, speed of the approach march, use of indirect fires, and crosstalk among attacking elements.

Step Eight. While the experiences of NTC Rotation 98-10 are still fresh in the Wildhorse Squadron's memory, future plans are already being formulated. The focus is now on positioning the squadron so that it can retrain to meet the standard, to win by even more decisive margins, in preparation for NTC Rotation 99-08 next June.

The citizens and soldiers of this great nation should be proud of our Army's progress since the Spanish-American War in 1898. Despite the challenges and setbacks of this last century, our Army of 1998 is committed to "one team, one fight, one future." As we study the lessons of history, more effective AC/RC relationships are beginning to emerge. The Blackhorse and its round-outs serve as an excellent example of highly effective AC/RC relations. Their mutual trust and support continues to be strengthened through almost daily interaction. Using standardized training strategies like the "8-step model," they are achieving new levels of training readiness. The Blackhorse provides training support to its round-outs, and in turn, receives additional combat power to train visiting BLUEFOR units. As a model of the synergy that our Army can achieve, the 11th ACR, the 1/221st Cavalry, and the NTC are committed to remaining full partners in providing world-class training to America's Army as we enter the 21st century. *Allons! Let's Go!*

Notes

[1]Schwarz, Fredric D., *American Heritage*, July-August 1998, The Time Machine "The Out-of-Date Army," p. 102.

[2]Lawson, Don, *The United States in the Spanish-American War*, Abelard-Schuman, New York, 1976, p. 13.

[3]Regan, Geoffrey, *Great Military Disasters, A Historical Survey of Military Incompetence*, M. Evans & Company, Inc., New York, 1987, p. 221

[4]Cosmas, Graham A., *America's First Battles, 1776-1965*, San Juan and El Caney 1-2 July 1898, University Press of Kansas, Lawrence Kan., 1986, p.147

[5]The "8-step training model" is a synthesis of key steps contained in *FM 25-101, Battle Focused Training*, and *TC 25-10, Lane Training*. BG (P) Cash brought this training method to the NTC from his assignment at the CMTC in Europe. Admittedly, it is simply "a way" to manage and conduct training, however, it is an effective and successful technique.

[6]11th Armored Cavalry Regiment TACSOP, 20 January 1995, Annex Q (Crew Validation).

LTC Aaron Kenneston commands the Nevada Army National Guard's 1st Squadron, 221st Cavalry. He has previously served as a brigade assistant S3, battalion XO, cavalry troop commander, and tank platoon leader. He holds a masters degree from California State University, Dominguez Hills. He is a graduate of both the Army and Air Force CGSC, and the Army War College Defense Strategy Course.

Under its VISMOD skin, this BMP is a converted M113.

A HMMWV, with a few additions, becomes a Krasnovian BRDM wheeled APC.

At left, a crew rests and refits after the battle. Above, the XO briefs the command group.

The Digital Reference

by Colonel Karl Gunzelman and Captain Sean Pritchard, Mounted Maneuver Battle Lab

The year is 2015. You are the battle captain in charge of current operations — a key member of the redesigned task force staff. The battalion commander's face suddenly appears on your teleconference screen. He sends satellite imagery of the enemy positions to your whiteboard terminal along with instructions to prepare an electronic OPORD in an hour. The screen goes black. Around you, the crew of your Staff Operations Vehicle has already begun to assemble data. The Friendly Ops officer has logged on to the TOTAL RECALL site and has begun providing information to the intelligent search agent. Within seconds you will have files from the Center for Army Lessons Learned showing what other units have done in similar situations, the results of their actions, and the lessons they learned. This information will prove critical in your effort to prepare an OPORD so rapidly. But is this scenario nothing but science fiction? Last June, the Mounted Maneuver Battle Lab (MMBL) conducted Battle Command Reengineering II (BCR 2) and examined just such a scenario. BCR is an on-going experimental program examining advanced digitization's effects on battle command at brigade and below. Among other subjects, MMBL examined an on-line manual — a precursor to TOTAL REI-CALL (Retrieve Information [REI] from Center for Army Lessons Learned [CALL]) the interactive system described in the above scenario. The on-line manual is another step in the MMBL and CALL cooperative effort to develop for the Army After Next (AAN) an on-line information retrieval tool to aid in situation analysis and decision-making during training and operations.

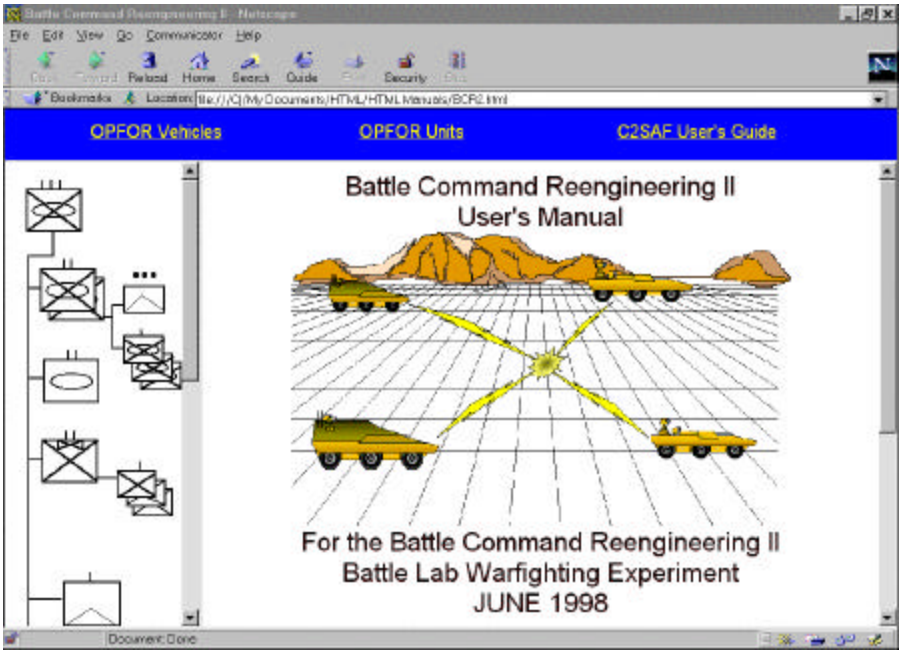
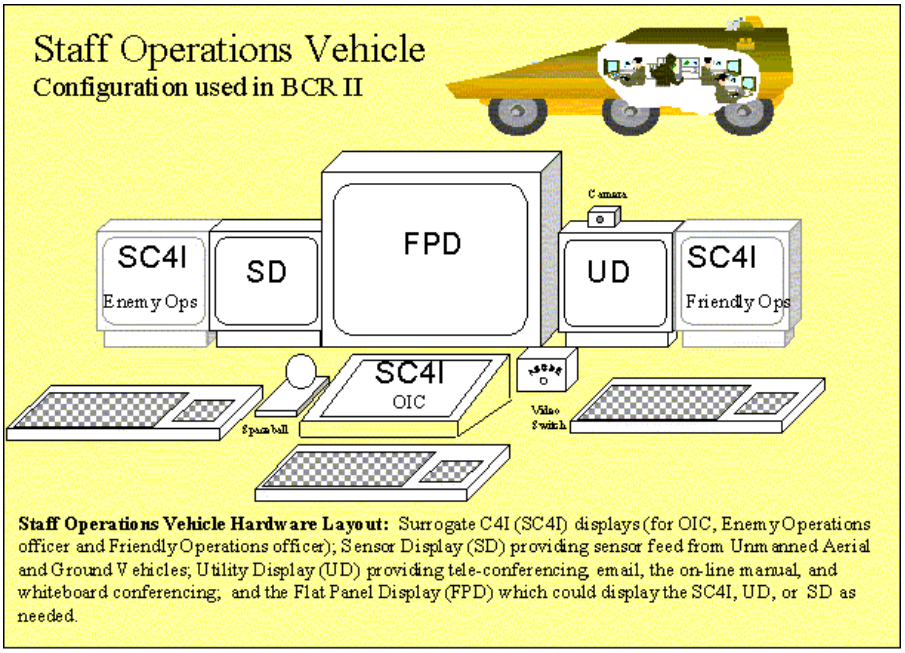


Figure 1. BCR on-line manual start page.



Staff Operations Vehicle Hardware Layout: Surrogate C4I (SC4I) displays (for OIC, Enemy Operations officer and Friendly Operations officer); Sensor Display (SD) providing sensor feed from Unmanned Aerial and Ground Vehicles; Utility Display (UD) providing tele-conferencing, email, the on-line manual, and whiteboard conferencing; and the Flat Panel Display (FPD) which could display the SC4I, UD, or SD as needed.

The on-line manual used in BCR 2 combines text and graphics into an intuitive web-based user interface to provide soldiers quick reference to information. Because the manual was written in hypertext markup language (HTML), it behaves similarly to a web page and is viewed in a web browser. The manual combines three separate sections: a hardware/software user's guide, an OPFOR order of battle, and an OPFOR vehicle/equipment reference. The site is organized using HTML frames. The top frame provides top level navigation between the three sections. The left frame shows the table of contents for the currently selected section. This table is provided in a combination of text and graphics to help the user quickly locate a subject. The largest frame provides the selected content. This layout allows the user to immediately move to another section or any location with just a click of the mouse.

Future improvements to the manual include linking the manual's subject matter to real-world examples that illustrate techniques and lessons learned, and to related material in the CALL database. For example, we can show how to maximize the BCR custom hardware and software's utility in planning and conducting operations. Links can also provide a user with AAR-style replay of previous BCR missions so that the user can examine the effects of different tactics, techniques, and procedures in relation to the future vehicles and technologies provided in BCR. A user interested in planning an Unmanned Aerial Vehicle (UAV) reconnaissance route could select from a list of clips showing previous UAV recon missions. A user interested in properly placing Unmanned Ground Vehicles (UGV) on a screen line to ensure sensor coverage in depth could select from a list of clips showing scout platoon screen line missions. Finally, a user faced with planning a complex deliberate breach could search the CALL database for similar missions. The use and continued development of the on-line manual will provide insights to guide the development of TOTAL REI-CALL.

The goal of the TOTAL REI-CALL program is to provide commanders and staff an on-line tactical information retrieval tool. The software will include an intelligent search agent, which prompts the user for all relevant information about the tactical scenario and then searches the database. The search agent will have the ability to identify parallels between the current tactical scenario and the scenarios of missions stored in the database. The search agent will provide the user with relevant missions and lessons learned. Additional software will allow the user to adapt the information and lessons from past missions into the current situation allowing virtual wargaming and rapid course of action development and analysis. The result will be that lessons learned from past experience can be injected into the planning cycle, thus improving planning efficiency and effectiveness.

TOTAL REI-CALL is one of a number of digital on-line tools being examined by the Armor Center. Digital references such as tactical and gunnery field manuals (FMs) and technical manuals (TMs) may become reality in the Army After Next. Virtual FM is an MMBL/Directorate of Training and Doctrine Development combined initiative to convert text-based field manuals to on-line 3D visualization. Another tool is the Digital Technical Manual, which could be combined with on-board vehicle sensors to automatically detect and diagnose mechanical faults. After detecting a fault, the digital TM could direct operators and mechanics to the relevant section of the database, providing procedures and parts information needed to correct the fault. As digital references mature, they may be integrated into one database combining TOTAL REI-CALL, Digital FMs, and Digital TMs. This database could be tailored to the user's needs at each level, vehicle, platoon, company, etc. The result would be a wealth of information available immediately which would help the soldier and leader maximize performance.

TOTAL REI-CALL involves a series of requirements and emerging technologies to meet those requirements. Data must be collected and indexed in CALL's database. Intelligent search agents and virtual modeling software must be designed. And the information must be on line and readily accessible. Several technologies will support TOTAL REI-CALL. The Training Feedback Module-Training Center Version (TFM-TC), a Windows-based/user-friendly software package, was recently implemented at the National Training Center. The TFM-TC captures mission conditions and relates them to task performance/task standards. It also provides information on how units have dealt with previously encountered situations. The TFM-TC further provides an automated means of executive summary report production, AAR preparation/presentation, and take-home package production. Once data has been captured, the MMBL will experiment to develop optimal methods for presenting the data to the user. As these technologies mature and are put into use, TOTAL REI-CALL will move towards implementation and the futuristic scenarios examined in BCR may become more reality than science fiction.

For more information on Battle Command Reengineering or other ongoing experimentation at the MMBL, visit their web site at:

http://knox-www.army.mil/mbbl

DRIVER'S SEAT

(Continued from Page 8)

tasks have been added to the course, ensuring that all graduates are introduced to the Future Battle Command Brigade and Below (FBCB2) hardware and software. Extensive training takes place in the SIMNET facility, challenging every aspect of leading, training, fighting, and maintaining the platoon. A significant period each evening is now spent on the terrain board and with the manuals in order to prepare for the next day's training. Let no sergeant arrive expecting a "gentleman's" course; all must work hard to master all requirements for graduation. Those NCOs with rusty study habits, or not possessing the required educational levels in math, reading, and comprehension, must visit their local educational centers — far enough in advance — and have their educational abilities assessed. Those who score low in the diagnostic exams need to take refresher courses in order to posture themselves for success in NCOES.

The requirement to take the APFT upon arrival is — and will remain — in effect. If and when the Army changes its policy on the APFT as an entrance requirement in NCOES courses, there will still be a requirement to pass the test for graduation. Come prepared to pass the test, and save yourself a lot of trouble.

No more "welcome packets" are being mailed to any students. AARs showed that less than 50% of the NCOs received the correspondence. Instead, prospective students can access updated information through the NCO Academy's Home Page. What subjects will be taught, what to prepare for, what to bring, what are the standards, and who are the points of contact are all on the home page.

http://www.knox.army.mil/school/ncoa/ncoa.htm

or

http://147.238.100.101/school/ncoa/ncoa.htm

The NCO Academy home page can also be accessed through the U.S. Army home page, the USASMA home page, as well as the Fort Knox and Armor Center home page.

Sergeants, access the course requirements and prepare yourselves both mentally and physically, for weeks of challenging classroom, simulation, and hands-on training. Come ready to be challenged and to excel.

SERGEANT, TAKE THE LEAD

BEAMHIT: This Marksmanship Training System Uses Lasers and Can Go Anywhere

by Captain Eric G. Dulin

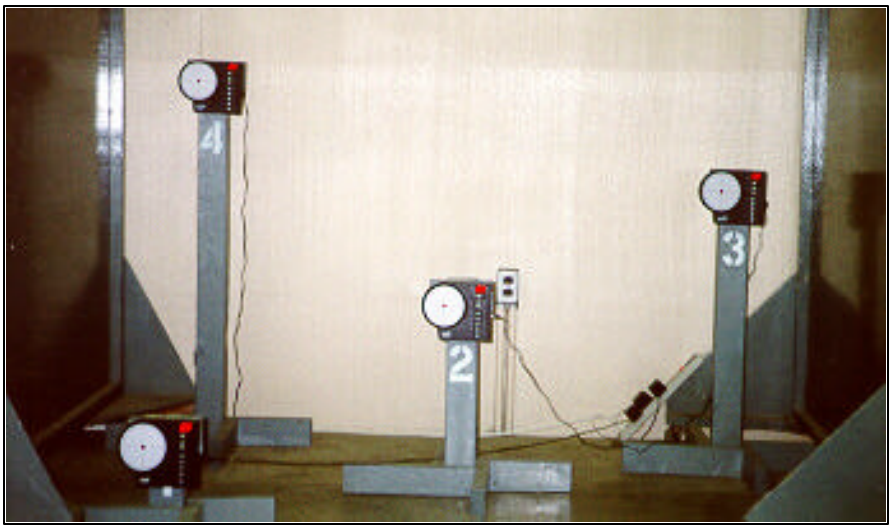
The BEAMHIT 330A and 110 Marksmanship Training Systems are indoor, laser-activated target engagement systems that can accurately engage targets, using actual weapons, without the use of live ammunition. These devices can be used for both basic and advanced marksmanship instruction. The major components of the systems include a laser transmitter, a laser transmitter rod, and a target sensor. The laser transmitter is adaptable to multiple weapons systems by the use of different laser transmitter rods. One end of the rod screws into the laser, and the other end of the rod fits into the barrel of the weapon. Vibrations from the weapon's firing mechanism trigger the laser when the weapon is dry fired. The systems require no ammunition of any kind. 9mm rods are standard with both BEAMHIT systems and both the M16A2 and M4 carbines can be used with an optional laser transmitter rod.

The differences between the two types of BEAMHIT systems are the size of the target, the feedback provided by the target, and the components required for more detailed feedback. The 330A system consists of a ten-inch, circular bull's-eye laser target with power supply, a laser transmitter, a 9mm-transmitter rod, a computer program, and electrical cables to connect the target to a 286 or higher computer. Once connected to the computer, the target's eye face is displayed on the monitor. When a soldier fires at the target, the laser beam emitted from the soldier's weapon strikes the face of the target, causing the target to emit a beep. The target instantaneously transmits the location of the laser strike to the computer, and displays it on the monitor. Subsequent laser beam strike locations appear on the monitor, and the distance between each laser hit, (the shot group dispersion) is measured.

The 110 system is a smaller eight-inch target that consists of a circular bull's-eye target with power supply, and a laser transmitter with a 9mm-transmitter rod. This target system provides hit or miss feedback to the shooter. When the laser hits the target, the target emits a beep, and displays the number of hits obtained on the right side of the target. The photo above illustrates the use of four BEAMHIT 110 targets on the M9 mini-range.

SGT Frank Megow, an instructor at C 3-81 AR, engages a 330A target using a pneumatic M4 carbine.

Below, a station of the BEAMHIT 110 M9 minirange. Targets are called off in a timed sequence providing challenging and realistic training.



Both systems are compatible with M4, M16A2, and 9mm weapons. When actual M4 carbines and M16A2 rifles are used with these systems, they must be recharged, by pulling back on the charging handle after each shot. The recharging action after each shot requires the soldier to break the cheek to stock weld. Although this is not a problem for an experienced shooter, such as a National Guard soldier practicing at the armory, this can be a difficult problem for a beginning shooter to overcome, and does not assist in teaching the proper basic marksmanship fundamentals. The photo at right illustrates pneumatic replicas of M4 carbines and M16A2 rifles that BEAMHIT designed for use in basic rifle marksmanship training. Both pneumatic rifles automatically fire every time the trigger is pulled, and do not have to be recharged. Soldiers who train on the M9 using the BEAMHIT system fire single action with no adverse impact on training, however, BEAMHIT has developed a pneumatic device to cock the M9 after firing, and provide a simulated recoil.

C Company, 3-81AR, the basic rifle marksmanship company for the 1st Armored Training Brigade, Fort Knox, Kentucky, uses the 330A system to train 19K and 19D One Station Unit Training (OSUT) soldiers, and basic training (BCT) soldiers, on the fundamentals of marksmanship. 19K OSUT soldiers receive training using the M4 carbine pneumatic rifle, while the 19D OSUT and BCT soldiers receive training using the M16A2 pneumatic rifle. The BEAM-

The pneumatic weapon replicas. From top to bottom, left to right, an M4 carbine, a laser transmitter and rod for the M4 / M16A2, a pneumatic M4, an M9, a laser transmitter and rod for an M9, a pneumatic attachment for a .45 cal pistol (now available for an M9), an M16A2, a laser transmitter and rod for the M4 / M16A2, and a pneumatic M16A2.

HIT 330A system has been integrated into the program of instruction (POI) for all three groups of soldiers for use during the first day of fundamentals training. Soldiers fire a three-shot group at a 25 meter zero target placed over the 330A target 15 meters away, from both the foxhole supported and prone unsupported firing position. Each soldier must achieve a three-round shot group with a shot group dispersion of less then 40 millimeters, or four centimeters. The four-centimeter circle is the building block for follow-on 25-meter shot grouping and zeroing training. The task, conditions and standards for the BEA MHIT 330A are:

***TASK**: Demonstrate consistent aiming during the BEAMHIT exercise.*

***CONDITIONS**: Given an M16A2 rifle or M4 carbine, computer target, BEAMHIT laser, and simulated foxhole, while wearing helmet and LBE.*

***STANDARDS**: Each soldier will fire two three-round shot groups, one from the foxhole supported, and one from the prone unsupported, each three-round shot group must fit within a four centimeter circle.*

The BEAMHIT 330A system allows the soldier to observe the strike of each round and monitor the dispersion. A drill sergeant or a marksmanship instructor critiques the shooter during firing for obvious fundamental errors. After the soldier finishes firing, the soldier and the instructor examine the computer screen. The pattern of the rounds on the screen can indicate fundamental shooting errors, such as improper breathing or trigger jerking, as indicated in *FM 23-9*. The photo on the next page illustrates the feedback received from firing the BEAMHIT 330A system.

The 330A system is an integral part of the 19K OSUT program of instruction for the M4 carbine. This system provides maximum benefit to the 19K soldier because the Weaponeer shooting system that Ft. Knox uses for 19D OSUT and BCT marksmanship instruction is not compatible with the M4 carbine.

SFC David Parker, SSG Michael Love, and SSG Uwe Thon, instructors at C 3-81 AR, developed a BEAMHIT 330A and 110 training system that provided enormous benefit for 19K 9mm instruction and was incorporated into the POI. The 330A system is used to develop basic shooting skills by measuring the shot group dispersion of a 12-round shot group fired at the 330A target at a distance of 15 meters. A soldier engages the target from the standing crouched position using the two-handed grip. The soldier is monitored by a drill sergeant or marksmanship instructor again for obvious shooting errors, such as improper breathing or trigger jerk. Once the soldier fires all 12 rounds, the soldier and the coach observe the computer screen and critique his performance by using the round strikes displayed on the screen.

The task, conditions, and standards for the BEAMHIT 330A are:

***TASK**: Engage a 15-meter BEAMHIT target using a M9 9mm pistol and laser transmitter with a shot group dispersion of 120mm or less.*

***CONDITIONS**: Day, from a standing firing position, engage targets from a given distance using the M9 9mm pistol with laser transmitter device, firing single action, while wearing helmet and LBE.*

***STANDARDS**: Soldiers must obtain 9 out of 12 registered hits within 120mm to receive a GO.*

The BEAMHIT 110 system is used to develop more advanced shooting skills such as target acquisition and engagement. Forty BEAMHIT 110 systems have been linked together to create a miniature, indoor 9mm pistol range. The targets are arrayed in ten four-target stations run as a complete firing order. Ten soldiers simultaneously engage the four targets at ranges of eight to ten meters as the target numbers are called off. The size of the targets, the minimal amount of time between engagements, and several simultaneous engagements, create challenging, realistic training.

The task, conditions, and standards for the BEAMHIT 110 system are:

***TASK**: Engage BEAMHIT 110 targets at eight meters using the M9 9mm pistol and laser transmitter.*

***CONDITIONS**: Day, from a standing position, at a given distance, using an M9 9mm pistol with laser transmitter device, firing single action, while wearing LBE and Kevlar.*

***STANDARDS**: The soldier must obtain eight registered target hits out of a possible twelve targets, with a minimum of two hits on each target to receive a GO.*

SGT Megow engages the BEAMHIT 330A from the prone unsupported position. The tank to his right supplies energy for re-cocking and simulates the weapon's "kick."

The BEAMHIT systems were first used for 9mm marksmanship training. An initial study conducted after their implementation into the POI showed an increase in the number of soldiers who qualified the first time, an increase in the number of soldiers who qualified expert, and a decrease in the average number of rounds needed to qualify each soldier. The BEAMHIT system was integrated into the 19K and 19D POI as a supplement to the target box exercise. The use of the BEAMHIT system provides each soldier an additional opportunity to fire simulated rounds and gain confidence in his shooting ability prior to firing live rounds for the first time. The pneumatic weapon, life-sized target, and four centimeter standard provide a realistic training experience.

The BEAMHIT system is a cost-effective training system. Although the primary purpose of the BEAMHIT is basic marksmanship training, both systems are excellent tools for marksmanship training prior to weapons qualification, and are frequently used by permanent party units on Fort Knox. The BEAMHIT is also useful to National Guard or ROTC units who need to conduct marksmanship training, but can no longer use indoor ranges. During the TRADOC Commander's Conference at Fort Knox in 1997, BEAMHIT unveiled the new BEAMHIT 2000, which is a "virtual reality" range. The BEAMHIT 2000 can use a picture to create a realistic, working, scaled, indoor reproduction of a weapons range, which operates with such simple tools as a computer, a bed sheet for a projection screen, and the laser transmitters and rods used with the BEAMHIT 330A and 110 systems. The device is very impressive, and could be extremely useful for forward-deployed units to conduct basic and advanced marksmanship training to include "virtual qualification."

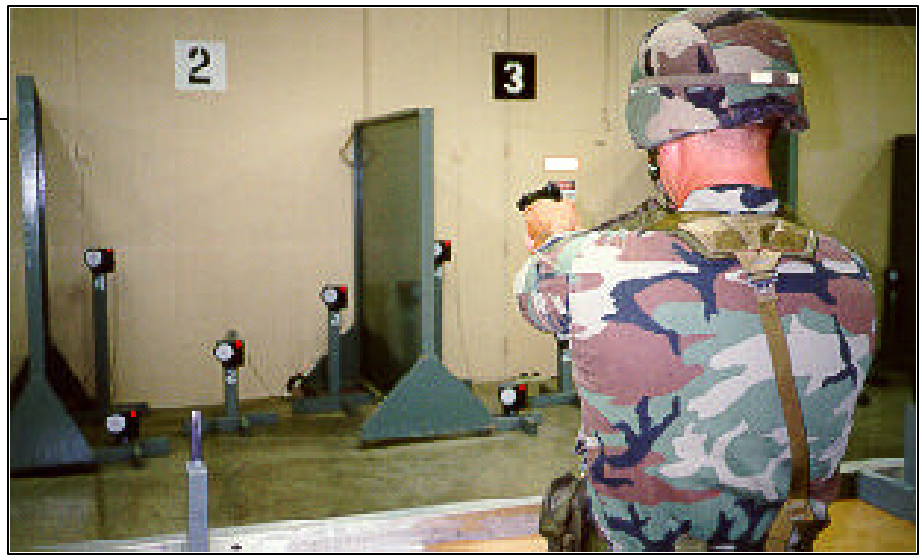
POINTS OF CONTACT

For information contact:

For BEAMHIT 9MM Training: SFC Ruise/SSG Thon, C 3-81 AR, DSN 464-7911

For BEAMHIT M16A2/M4 Training: SSG Stroud, C 3-81 AR, DSN 464-4867

For information on BEAMHIT devices: Mr. Steve Rosa, BEAMHIT Corporation, 1-800 BEAMHIT



SSG Uwe Thon, one of the three soldiers who developed the M9 POI, engages the BEAMHIT 110 systems during a M9 minirange exercise.

The results of SGT Megow's three-round shot group. The darker circle on the monitor indicates the center of mass of the three-round group. The results are within the 40mm dispersal required.

CPT Eric G. Dulin was commissioned in Armor from the Louisiana State University ROTC program in 1993. He served in 5-17 Cavalry, Korea, as a scout platoon leader, troop executive officer, and support platoon leader. He was assigned to Ft. Knox where he served as an executive officer for B 2-81 AR, a 19K OSUT training company, and as the commander for C 3-81 AR. He is currently a student in the Armor Officer Advanced Course.

M1A2 NET Team Combines Military and Civilians In a First for the Army

by Tom Werth and Specialist Randy Hughes
Photo by Major Brian Raftery

Tank moves from deprocessing site to unit's motor pool.

Because of the reduction in military manpower within the Army's Training and Doctrine Command (TRADOC), the command had to withdraw its support of the Army Materiel Command's New Equipment Training (NET) mission. Soldiers previously assigned to NET have been reassigned to divisional units. In a "first" for the Army, this function will be assumed by private industry, which showed interest in conducting contractor new equipment training through presentations made to the Department of the Army (DA) staff.

Due to the reduction in force and a hiring freeze, AMC could no longer support adding DA civilians or increasing the military NET TDA strength at the Tank-automotive and Armaments Command (TACOM) to sustain operator, crew, and unit maintenance training on the M1A2. Direct Support (DS) and General Support (GS) training for the M1A2 NET and NET management continues to be accomplished at TACOM with DA civilians providing matrix support to the Program Manager (PM).

In order for the PM to meet fielding goals and continue hands-on training for the M1A2 tank system, a new NET team (NETT) was formed consisting of 14 military instructors and 30 contractors. Their mission is to provide M1A2 training for officers, warrant officers, and enlisted soldiers in armor, cavalry, and support units.

The decision to augment the NETT with contractor instructors was made by the Abrams PM in February 1996. The existing basic order agreement contract was used to speed up the contracting process. A statement of work was completed by the PM, TACOM, and Ft. Knox's NET personnel.

The contract was awarded to General Dynamics in May 1996. GDLS hired instructors from within that were M1A2 qualified, and brought in additional GDLS personnel from the M1A2 Saudi tank program, who were re-qualified on the U.S. M1A2 tank at Ft. Knox. All of the new combined NET instructors were relocated to Ft. Hood in August 1996 for final certification, and the first integrated NET team started in October 1996 with organizational maintenance training for the 2/12 Cav, 1st Cavalry Division.

The 44 personnel of the current combined NETT consists of 13 senior instructors and a NETT NCOIC from Ft. Knox's 16th Cav, 29 instructors, and one site manager from General Dynamics, plus augmentees from the unit receiving the training.

The training consists of three parts — classroom, motor pool, and TTI-VIII. In the classroom, students are taught the difference between all the components on the M1A1 and the M1A2, with the help of Crew Station Trainers or CSTs. NET training starts during tank issue week. The tanks have been previously deprocessed, inventoried, and repaired by TACOM's Materiel Fielding Team. During issue week, each company/troop reports to the fielding site and, with the help of an instructor, performs PMCS and inventories BII. The instructor then drives the tank to the unit's motor pool. In the week following issue week, units report for the classroom phase of training.

The Crew Station Trainer is a valuable, flexible training tool, which allows a large student-to-instructor ratio during NET. The CST provides a Driver's Integrated Display (DID), Commander's Integrated Display (CID), Gunner's Control Display Panel (GCDP) and all the screens and menus required to teach the student the M1A2 tank systems. It is also valuable in training the unit mechanic, who can access valuable fault data from the DID. The CST will allow platoon, company, and battalion exercises without actually using the tank, saving OPTEMPO costs and reducing training time. After the classroom phase is complete, students are taken to the motor pool where they perform hands-on training. It's here that the students are tested on all classroom instructions, including any new training learned in the motor pool. Every student must qualify on the Tank Crew Gunnery Skills Test before going down range on any qualification table. The course length is a total of 59 days for a battalion. TTI-VIII is also accomplished at this time, with NETT assistance running ranges, providing direction, and conducting after-action reviews for each crew. This ensures the crew uses the M1A2 tank to its maximum capacity.

A combined team of military and civilian instructors train the hull (63E) and turret (45E) mechanics for three weeks. The students are trained and certified prior to the unit taking delivery of their new tanks. The instructors then visit each unit during the gunnery portion of NET to further train and assist mechanics if they have a vehicle breakdown during gunnery.

The joint military and civilian NETT completed OP/CREW and UM/NET for the 1CD in July 1997. Comments from the field on the combined military and contractor NETT were all positive, and soldiers say that this new combined NETT gives them the training they need to operate and maintain the M1A2.

According to the Abrams Tank NET Manager, the evaluation of the combined NETT is excellent. The structure and expertise of both the military and civilian team members is providing soldiers with exceptional training and is ensuring that we have the "best tankers for the best tank in the world." Each company or

troop is interviewed upon completion of NET by the NETT manager, NETT NCOIC, General Dynamics Site Manager, and the 16th Cav Deputy Gun Div Chief to ensure that training is improved wherever possible.

After completion of NET at Ft. Hood, the entire team relocated to Ft. Carson, where training has started for leaders and maintainers, and OPNET, which was to start in Jan 99 for the 3d ACR. After August 1999, the NETT relocates to the first unit to receive the M1A2 SEP to accomplish training for that battalion.

The PM continues to use the basic order agreement contract to keep the NETT up to strength with contract instructors so units can be trained to the best possible level.

MSG(R) Tom Werth has over 35 years of service to the U.S. Army. Following his 20-year career as a noncommissioned officer, he has served as an instructor, training specialist, and training manager for the Tank-automotive and Armaments Command (TACOM). He is currently serving as both the TACOM combat vehicle New Equipment Training (NET) leader and as the Training Manager for the Project Manager, Abrams Tank System.

Specialist Randy Hughes works for the Tank-automotive and Armaments Command (TAGOM) Public Affairs Office.

MAJ Brian Raftery was commissioned in Armor in 1987. He has served as a tank platoon leader, tank company XO, tank company commander, tank battalion maintenance officer, and as the M1A2 fielding officer. He is a graduate of the Armor Officer Basic Course, the Armor Officer Advanced Course, the Combined Arms and Services Staff School, and he holds a BS degree in mechanical engineering from the U.S. Military Academy and a MS degree in mechanical engineering from the Pennsylvania State University. He is currently assigned as the Abrams Fielding Operations Officer for the Project Manager, Abrams Tank System.

COMMANDER'S HATCH (Continued from Page 7)

ducted in the live environment. CCTT is the next step in a unit-level training system, a significant improvement in our SIMNET capability. TWGSS and PGS provide the tank and Bradley force with precision engagement capability utilizing the M1 or M2/M3 fire control system. This is significant to the commander who must assess the readiness of his crews and their maintenance of fire control systems during both gunnery and maneuver training. TWGSS/PGS offers us the one best system for crews to use for training at home station, the CTCs, and while deployed.

Of course, the MTS is not solely focused on virtual and constructive gunnery training. Live gunnery is still what allows crews and platoons to maintain their finely honed edge. To that end, we recognize that the overall capabilities of our weapons systems have outpaced the ability of our live fire ranges to challenge them. We have drafted an Operational Requirements Document (ORD) for the Digital Multi-Purpose Range Complex (D-MPRC). Significant elements of the D-MPRC ORD call for expanded width and depth, incorporation of next-generation target systems, and numerous technical innovations. The most significant improvement, however, would be the integration of information systems into the range. These will provide the situational awareness to train staffs, leaders, and units to use information dominance to attain precision maneuver as well as fires to shape the battlefield.

Besides these new technologies, there are new training approaches that have evolved, the Force XXI Training Program and the Three Step Digital Learning Strategy which will greatly complement our Mounted Training Strategy. The Force XXI Training Program uses structured training support packages to develop competency and synchronization skills at the brigade and battalion staff leader level before expending resources on more expensive training events. These products follow a structured training methodology and have been developed to focus on the most common deficiencies, as reported by CALL and the CTCs. These Force XXI training products are all scheduled to be fielded during FY 99 and will make a tremendous vehicle to train future staff officers.

The Three Step Digital Training Strategy provides a context for commanders to understand and focus their training programs utilizing the information systems currently being fielded. The Digital Training Strategy follows these three steps:

Step 1 - basic competency in the staff position, staff section, staff group, and then integration of the entire staff;

Step 2 - learning the hardware and software of digital information systems;

Step 3 - total immersion in a tactical environment created in the virtual and constructive simulation using Training Support Packages (TSPs) to drive the exercise. Constructive simulation allows us to train repetitively, but it isn't until we have units in the field that staffs fully appreciate the "friction" of mounted training and operations. We have significant challenges in this area that make it essential for the Mounted Training Strategy to include the resources required to train and maintain the highly perishable skills associated with digital Command, Control, Communications, Computers and Information (C4I).

Final thoughts:

The changing global environment requires Army trainers to consider what missions to train for, what predeployment standards must be met, and how this training can most efficiently and effectively be accomplished for both AC and RC units. The Mounted Training Strategy is the catalyst for units to plan and execute that effective training across the spectrum of live, virtual, and constructive simulation. It will allow commanders to focus on individual, staff, and unit proficiency in selected "core" tasks across the full spectrum of conflict. The Mounted Training Strategy will exploit the potential of the Force XXI training products, maximize the benefits of the latest developments in TADSS, and capitalize on the proven doctrinal training concepts. The result of this effort will be combat ready soldiers, competent staffs, tactically proficient leaders, and finally, "killer" platoons and companies that will be successful against any type of threat across the spectrum of conflict. Lastly, I want you to know that we need your input in order to make the Mounted Training Strategy work for your unit. My point of contact for this effort is Colonel Bill Blankmeyer, Director of the Directorate of Training and Doctrine Development.

Forge the Thunderbolt!

conditions. This greatly improves accuracy while firing on the move. HAS can save over a ton of weight compared to conventional torsion bar suspension systems, which contributes to the paramount overall goal reducing weight. Arguably, HAS is not as critical for the FSCS as it is for a much heavier vehicle (FCS?), but it will dramatically enhance the FSCS' ride quality speed, and thus warrants serious consideration. Critical for survivability, the HAS equipped FSCS's reduced silhouette will give it an important battlefield advantage when on silent watch or during other missions requiring minimum visual signature.

Implementation of Composites in the FSCS

To allow rapid deployability and facilitate transportability, weight reduction is one of the dominant and mandatory prerequisites imposed on the FSCS. To achieve meaningful weight savings, the crew must be repositioned in the hull (see FMBT/FCS) such that the overall protected envelope could be dramatically reduced. A possible way of complying with this requirement is to manufacture the hull and possibly the 'turret' out of composites with reinforcement of titanium or other light but strong metallic components to serve as a 'skeleton' for maintaining structure integrity. In essence, the issue is to achieve large-scale economical production while establishing the level of confidence in the ability of composites to be successfully applied in armor structural applications. To gain additional weight reduction, the tracks and road wheels must be made of composites, although they may also contain metallic components for reinforcement. Affordable composites technology could be demonstrated as a cost-effective alternative approach to manufacturing vehicle components. Applications may include road wheels, suspension components and track shoes, leading to significant weight reductions and increased durability. Composite materials utilized in the production of structural elements are lighter than steel and can improve a vehicle's fuel consumption, cross-country speed, operational range, and battlefield endurance.

A four-year contract to develop a lighter, more transportable composite armor vehicle was awarded to United Defense L.P. in 1994. The program is aimed at exploring the use of composite materials in structural applications to reduce weight, enhance vehicle survivability, and improve deployability. In order to reach applicability, there are still many practical problems that must be resolved associated with ballistic and structural integrity, non-destructive testing, signature reduction, producibility, and field reparability. The program is focused on developing a medium-size chassis (17-22 ton) for typical applications such as the FSCS. It is expected that as much as a 50% weight savings could be achieved in the future compared to a conventional steel structure. Composites technology will bring substantial reductions in size and weight of the high performance FSCS without sacrificing operational capabilities. Indisputably, lighter vehicles offer many advantages in the form of strategic deployability, tactical mobility, and sustainability.

The FSCS Scenario - A Major Digitized Battlefield Contributor

Operational requirements dictate that the FSCS should operate as a 'system' while functioning and communicating beyond the conventional, rather narrow, tactical level. The FSCS will be an active node on the battlefield-digitized network. This is a dramatic departure from the conventional way mechanized tactical surveillance and reconnaissance scout and cavalry vehicles have operated since their inception. The FSCS will assist the local commander and crews in obtaining real-time digitized information on the close-area battlefield. This information will be used by the local forces, but also will be conveyed to Greater Area War Management Centers. Vital information on enemy targets obtained from the FSCS, will be prioritized and fed back to tanks, artillery, infantry, and ground attack aircraft.

The FSCS will be an integral part of the digitized (computerized) battlefield network system and will serve as its "eyes and ears." Much has been recently written about the essence of battlefield digitization, so we will not elaborate any further here. The FSCS will have a *second*-generation vetronics system that will further advance digitized data control and distribution, electrical power generation and management, computer resources, and crew control and display processes. The vetronics system will accept a variety of inputs, while delivering outputs related to power system control, sensor control, communications, countermeasures, weapons control, artificial intelligence, training, maintenance, diagnostics, and prognostics. This architecture will provide the interface between the various functional modules, computer, and power resources.

Concluding Remarks

In preparing this article, we have come to realize that there are many similar attributes in the underlying philosophies among the FSCS as we envision it, the Future Combat System (FCS), and the Air Ground Defense System (AGDS) that we described in previous articles published in *ARMOR*. We ask for the reader's forbearance for the repetition of these similarities as outlined here. They were mentioned only where they helped in understanding the prevailing concept and the conceptual evolution of the FSCS. Like our Future Combat System (FCS) concept, the proposed particular configuration of the FSCS is not as important as the core idea behind its conception. A revolutionary sensing and monitoring 'suite,' greater lethality, reduced signature, extraordinary survivability, improved deployability, enhanced communications, mobility, endurance, and substantial reduction in logistic reliance are key to FSCS.

The FSCS is a very advanced mechanized tactical surveillance and reconnaissance scout and cavalry vehicle. With its extended information-gathering capabilities, it pushes the boundaries of technology currently available. It is almost an all-electric platform that uses electricity as a dominant energy source. Electricity is used to power its laser gun, main power train, and all other self-defense suites, sensors, communications, fire control systems and various auxiliaries. It is designed to be highly reliable by virtue of advanced technologies requiring only low-level, and in some cases, virtually no maintenance during operation. It will be closer to the logistician's 'dream war machine' than any other armored vehicle ever produced. The FSCS will influence armored warfare because it will provide essential real-time information. It is quintessential in allowing the combatant ground component to achieve information dominance on the 21st century battlefield.

The FSCS is categorically *not* a direct offensive weapon system and should not be envisioned, designed, or deployed as such. Its primary "weapon" is its sensor suite. Once detected and identified, it will be a prime target for enemy forces, particularly tank hunters and attack helicopters. The FSCS' main role, to the extent possible, is to perform its surveillance

and reconnaissance missions while being entirely *transparent* to the enemy. This will dramatically increase its survivability and ability to fulfill its critical missions. Its predominant underlying operational philosophy should always remain: *'The FSCS's strength is in its stealth...'*

The FSCS, as capable as it promises to be, must compete for availability of funds for R&D like any other major development program. The fully justified requirement to support the existing M1 series tank fleet until a new tank becomes available, while preserving the industrial base for armor design and production, will limit the allocation of funds set aside for the FSCS. The FSCS's ultimate destiny, among other major development programs, was determined in the recent Army's Quadrennial Defense Review (QDR) that will dictate the Army's shape for the next 20-30 years. The proposed FSCS, with its powerful main armaments, alternative unique energy source to operate almost all systems, enhanced self-defense capabilities, digitized communications, computer networking ability, precision navigation and advanced aerial sensors, will be a paramount member of Army XXI and beyond. It has all the necessary ingredients to succeed.

***Note**: All information contained in this article was derived from open sources and the analysis of the authors.*

Western Design HOWDEN (WDH) is a small defense company in Irvine, California, which specializes in the design, development and production of ammunition and material handling systems for the U.S. and International military markets. WDH's track record includes a variety of air, land and seaborne weapon systems which require automated feed, resupply and optimized ammunition packaging. WDH has been involved among others in the Tank Test Bed, AC-130U Gunship, AH-64 Apache and Tank Compact Autoloader Programs.

Mr. Lawrence Bacon is the Director of Graphic Arts at WDH where, for the past 19 years, he has been responsible for creating numerous concepts for automatic ammunition handling, loading and storage systems.

Dr. Asher Sharoni, formerly the Director of Engineering with WDH, is the president of Howden Fluid Systems. He holds a Sc.D. in Mechanical Engineering from MIT and a M.Sc. and B.Sc. in Mechanical and Industrial Engineering from the Technion, Israel Institute of Technology. He is a former colonel in the Israeli Defense Forces, in which he was involved in various major armored weapons developments. Dr. Sharoni has accumulated more than 30 years of active experience in armor development, design, testing and production.

[Editorial Note: A. Sharoni and L. Bacon have co-authored the following other articles in ARMOR: The U.S. Future Main Battle Tank (FMBT); Autoloaders For Future Tanks; The Common Chassis Revisited: Should the Next Howitzer Be Built on the M1 Chassis?; Forward Area Air-Ground Defense For The Armored Forces-Revisited; and The Future Combat System (FCS).]

Continuous Band Track (Continued from Page 21)

- Installation procedures are cumbersome at best and require lifting one side of the vehicle off the ground (a logistics problem for replacement in the field).[11]

Challenges that must be overcome include battlefield repairs (short tracking), ease of installation, sprocket durability, and heavier GVW applications. Additional testing has been conducted on the M113A3 uploaded to 15 tons with positive results. TACOM is also planning to evaluate band track on a 25-ton Bradley Fighting Vehicle during 1999. Soucy is in the final design stage of a battlefield repair kit and Alvis Vehicles Ltd. (the CVR(T) manufacturer) is examining air bags to lift the CVR(T) thereby enhancing installation/battlefield repair.

Conclusion. Continuous band track offers the potential to reduce platform vibration, internal and external noise emissions, track weight, and platform maintenance. These benefits directly translate to higher reliability and availability, stealthier platforms, increased payload capacity, reduced GVW, greater mobility, and lower O&S costs. While the current focus has been on retrofitting existing tracked vehicles, the high payoff may occur on future combat systems where band track technology can be engineered into the overall design scheme. Although further evaluation is required, continuous band track has demonstrated the potential to meet future standards of increased force sustainability while maintaining critical mobility characteristics for both legacy and future lightweight tracked combat systems.

Notes

[1]"Wheeled Versus Track Vehicle Study, Final Report," Studies and Analysis Activity, Headquarters U.S. Army Training and Doctrine Command, Fort Monroe, Va., March 1985, 1-68.

[2]Ibid, 1-86.

[3]Ibid, 1-76 and 1-86.

[4]Army RD&A, "TACOM Awards DEUCE Production Contract," November-December 1996.

[5]Soucy Web Page, Military Applications. Online. Available @ http://www.soucy-group.com/web/International/Emilitary.htm. 6 November 1998.

[6]"Summary Test Report of the Experimental Band Track for the M113 Armored Personnel Carrier," Wayne Lucas and Kenneth D. Scott, Yuma Proving Grounds, Yuma, Ariz., May 1997, 2.

[7]Ibid, 8.

[8]Ibid, 10.

[9]Ibid, 6.

[10]Ibid, 13-15.

[11]Ibid, 6.

Mr. Paul Hornback is a general engineer with the federal government. He is presently assigned to the HQ TRADOC Combat Development Engineering Division, Fort Knox Field Office, which provides reliability, maintainability, and systems engineering support to the Directorate of Force Development, Fort Knox, Ky. He holds a Bachelor of Science in Mechanical Engineering and a Master of Science in Industrial Engineering, both from the University of Louisville. His military experience stems from a six-year tour as a UH-1N helicopter pilot in the U.S. Marine Corps.

TACTICAL VIGNETTE 99-1

FORGING STEEL — Exploiting a Brigade's Success

Situation:

You are "Hammer 6," the Task Force commander of TF 1-40, (BDE Reserve), with two tank teams (M1A2) and one mech team.

The brigade just conducted a deliberate attack against a stationary enemy mechanized infantry battalion (MIBN) on Objective Anvil. Objective Anvil is located three kilometers to the west of PL Red. The brigade's attack was a success. However, it encountered less resistance than expected and the reserve, TF 1-40, was not committed.

The other two task forces of the brigade are currently consolidating and reorganizing along PL Red. Your task force is postured in Tactical Assembly Area Pittsburg 2 km west of PL Red.

Enemy:

Division intelligence reports indicate there is a key bridge site along the river Quasimodo that must be secured. The bridge site is currently undefended and is the only way across the river. An enemy MIBN (6 T-80s and 15 BMPs) is moving west toward the bridge with an ETA of 40 minutes. In the south, your scout #3 reports enemy vehicles, 2 T-80 tanks and 5 BMPs, moving northeastward. These vehicles are suspected remnants from the MIBN defeated on Objective Anvil and are most likely moving towards the bridge site in an attempt to secure the bridge and defend it until the MIBN from the east can reinforce them. In the north, scout #1 reported 2 tanks vicinity grid 040205 and a small dust cloud behind them moving southwest out of the town of Dirkheim. Before scout #1 could pass any further information, radio contact was lost.

Task Organization

Tm A ▲ ▲ ▲

Tm B ▲ ▲ ■

Tm C ▲ ■ ■

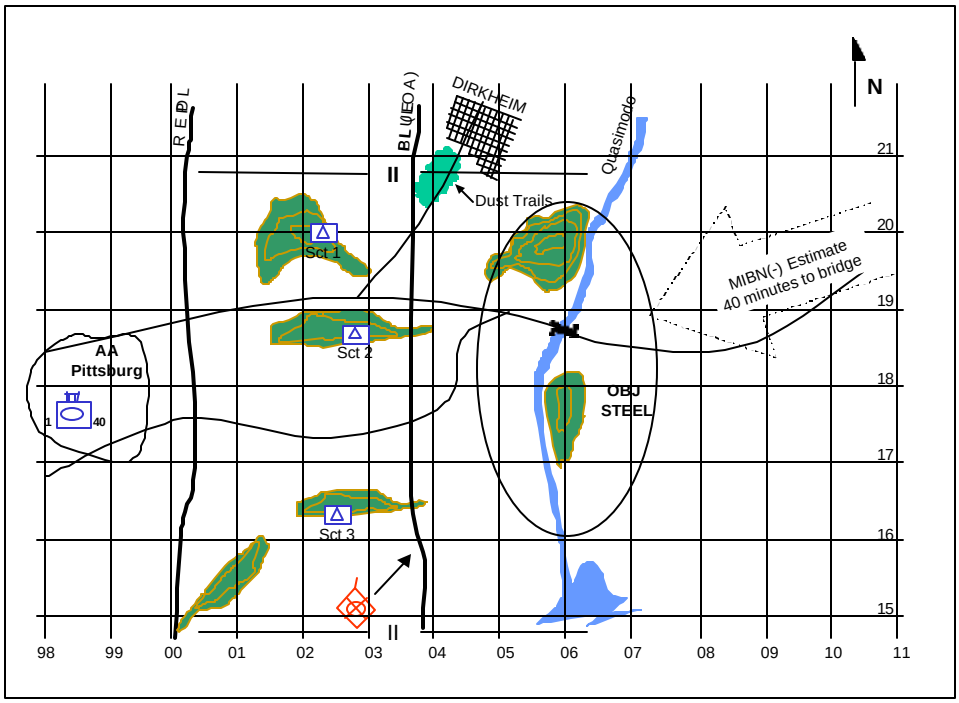
B En (-) 2 volcanos

TF Mission:

The brigade commander wants to capitalize on the success of his attack and he wants your TF to exploit that success! The commander issues a FRAGO to your TF. Your mission, Hammer 6, is to attack to secure the bridge site on Objective Steel. You have priority of FA fires (1 DS Bn with DPICM/HE/Smoke). You will also have 2 sorties of A-10s loaded with Mavericks on station in 15 minutes. You must act now! What do you do!

Requirement:

You have ten minutes to assess the situation and formulate a FRAGO. Issue your FRAGO as if talking on the radio to your company commanders. Submit your solutions to the Bn/Bde Branch by e-mail at: BilaferJ@ftknox-dtdd-emh5.army.mil, or mail your solution to ARMOR, ATTN: ATZK-TDM, Fort Knox, KY 40121-5210.



SOLUTIONS — TACTICAL VIGNETTE 98-5

"Zone Recon To LOA Steelers" from the September-October 1998 issue of ARMOR

THE PROBLEM

Situation:

You are "Wolfpack 6," the commander of Delta Team, TF 3-37, with two tank platoons and a mech platoon. Sunrise is at 0600, sunset at 1800.

Enemy:

The 52d MRB has seized Bensonville to our north. It is set up in a deliberate defense on the south side of the town in OBJ GREEN (encompassing OBJ YELLOW and OBJ BLUE, which is east of YELLOW) oriented south. In OBJ YELLOW, we expect an MRC(+). The TF S2 templates that the enemy is established in a well-prepared defense out of contact, with three MRPs in a horseshoe formation tied into the terrain and a dismounted infantry strongpoint on the west side of his defensive position. This strongpoint is templated to have an AT firing line composed of 2A45Ms and AT-5s. The enemy also has an extensive obstacle belt, three dismounted reconnaissance teams (DRT), and two CSOPs forward in the security zone (see map board with original enemy SITEMP and R&S graphics).

The most probable and most dangerous course of action is for the enemy to courageously hold his defensive positions and die in place. He will attempt to piecemeal friendly units with obstacles and indirect fire and destroy them in his kill sack as they move through the restrictive NTC-like terrain north toward Bensonville.

Friendly:

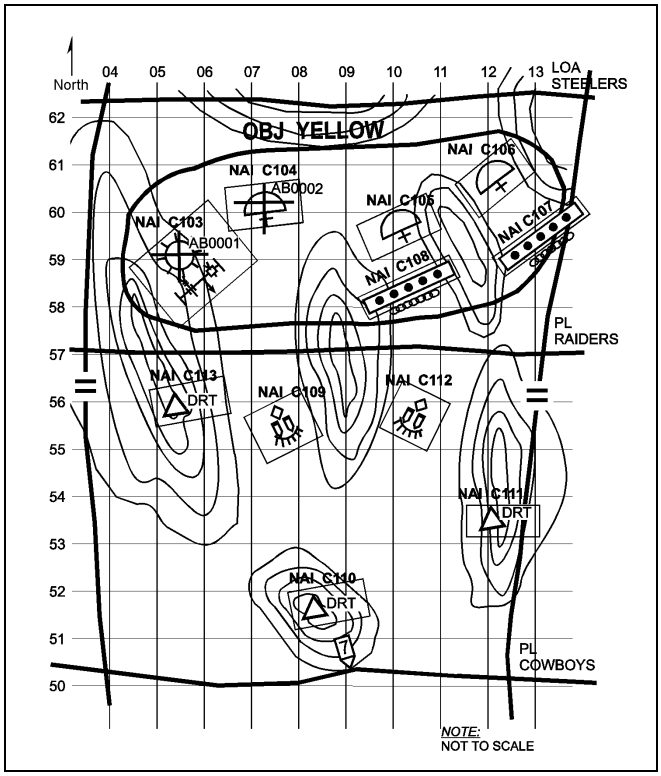
TF Mission: As the main effort of the brigade's attack on OBJ GREEN, TF 3-37 attacks 310600AUG98 to seize OBJ YELLOW, vic 085595, to facilitate passage of follow-on forces that will gain control of Bensonville vic 130700.

Last night the TF scout platoon, which had only six operational HMMWVs, infiltrated through the zone to attempt to reconnoiter enemy positions and obstacles. As of first light this morning, the TF TOC has lost communications with the scouts. Before the TOC lost communications with the scouts (VIPERS), it had received the following information:

- **A section** (VIPER 2 and 3).
  - One vehicle requires recovery vic 044580; the other vehicle is FMC and a patrol is conducting dismounted reconnaissance vic 045594.
  - Reported complex obstacle (triple-strand concertina with AT and AP mines) running NE-SW with difficult bypass at SW end vic 059568; dismounted enemy activity vic 055591.
  - Last SITREP at 0445.
- **B section** (VIPER 4 and 6).
  - Reported point obstacle (wire and mines) with difficult bypass on north side grid 119580.
  - Last reported grid 112606. Last transmission at 0300: "CONTACT NORTH, OUT!" No further contact.
- **C section** (VIPER 1 and 5).
  - Reported two BMPs stationary vic 076556 oriented S-SE at 0030; wire/mine obstacle oriented NE-SW vic 074587 at 0200.
  - VIPER 1 destroyed vic 078588 at 0230; all KIAs.
  - VIPER 5 conducted dismounted reconnaissance and reported tracked vehicle activity vic 100600 at 0300; three T-80s (stationary in a hide position) vic 079609 at 0400.
  - Last reported grid 062608, relayed through VIPER 2 at 0445.

Without a clearer picture of the enemy, the TF commander believes that tomorrow's attack will be unsuccessful. He wants you to assume the mission of the scout platoon. At 1630, just as your 1SG arrives at your assembly area with the LOGPAC, the TF commander issues a FRAGO directing you to conduct a force-oriented zone reconnaissance to LOA STEELERS to confirm or deny the S2's template. He wants you to reconnoiter all NAIs; to identify the composition, disposition, and array of enemy forces in OBJ YELLOW and the obstacles in the security zone; and to destroy CSOPs and any other reconnaissance assets in zone. He attaches an engineer squad and an extra FIST to your company team to assist you in your mission, and he orders you to position both FIST-Vs in OPs where they will be able to observe preparatory fires on the objective. He reminds you that all friendly elements, including scouts, must be at least 2 kilometers from any preplanned targets because the brigade commander has given him MLRS support for the attack. You have priority of artillery fires until 0600, and you are primary shooter for AB0001 and AB0002 prior to the attack. After completing your reconnaissance mission and positioning your FIST-Vs in OPs, you will consolidate your remaining forces at CP 7 and fall in as the trail company team of the TF diamond during the attack. You may leave FIST-Vs and dismounted OPs north of PL COWBOYS, but you must have the rest of your company team positioned at CP 7 prepared to attack when the TF comes through.

The time is now 1700, and the sun will set in an hour. Your assembly area is 3km south of the LD, and the LD is 10km south of PL COWBOYS. The attack is planned to begin with preparatory fires at 0600. You must act now! What do you do?



THE SOLUTIONS

Author's Solution

(NOTE: This solution is in the form of a FRAGO from WOLFPACK 6, the commander of Delta Team, TF 3-37. The team comprises two tank platoons and a mech platoon.)

SITUATION

General:

Last night, the TF scout platoon (VIPERS), with six operational HMMWVs, infiltrated through the zone to conduct reconnaissance of enemy positions and obstacles. As of first light, the TF TOC has lost communications with the scouts. The attack is planned for tomorrow morning at 0600. Without confirmation of his IPB, the TF commander has serious reservations about the enemy situation and scheme of maneuver for tomorrow's attack. To ensure the operation's success, he has directed us to complete the mission of the scout platoon.

Enemy:

Intel update follows. Before contact was lost, the TF scouts reported the following enemy situation:

- Complex obstacle (triple-strand concertina with AT and AP mines) running NE-SW with difficult bypass at SW end vic 059568.
- Dismounted enemy activity vic 055591 at 0445.
- Point obstacle (wire and mines) with difficult bypass on north side vic 119580.
- Two stationary BMPs oriented S-SE vic 076556 at 0030.
- Wire/mine obstacle oriented NE-SW vic 074587 at 0200.
- Tracked vehicle activity vic 100600 at 0300.
- Three T-80s stationary in hide position vic 079609 at 0400.

An obstacle in the west, although not templated, has been confirmed by the scouts. The enemy's countermobility capabilities are not unlimited. If, as the scouts report, there is a large complex obstacle in the west, the enemy must be weak somewhere else. Additionally, VIPER's B section was able to maneuver to 112606 without reporting any contact; this tends to deny the presence of the templated CSOP in NAI C112 and an obstacle and MRP in NAIs C107 and C106 respectively. Based on this information, I think he is probably weaker in the east than in the west.

Friendly:

Before contact was lost, scout locations were reported as follows:

- **A section** (VIPER 2 and 3): one vehicle needs recovery vic 044580; the other vehicle is FMC and is collocated with the bent vehicle; patrol is conducting dismounted reconnaissance vic NAI C103 (grid 045594).
- **B section** (VIPER 4 and 6): last reported at grid 112606; assumed to be zapped.
- **C section** (VIPER 1 and 5): VIPER 1 zapped vic 078588 at 0230 (all KIAs); VIPER 5 is conducting dismounted reconnaissance, last reported grid 062608 at 0445 (relayed by VIPER 2).

Additional graphic control measures:

Add the following graphic control measures:

- Platoon boundary along N-S grid line 09.
- PL OILERS along E-W grid line 53.
- CP 8 at 121572.

MISSION

Wolfpack conducts a zone reconnaissance NLT 301730AUG98 to LOA STEELERS to destroy enemy reconnaissance forces, confirm or deny the presence of other enemy forces and obstacles in zone, and establish OPs to observe enemy defensive positions. Consolidate at CP 7 NLT 0600.

Intent:

Our main reconnaissance effort will be in the east, because I believe that is where the enemy is weakest. I want to destroy DRTs and confirmed CSOP, observe NAIs C103, C104, C105, C108 to confirm or deny templated enemy MRPs and obstacles. I want to clear NAIs C106 and C107 to confirm or deny a templated MRP and obstacle in those NAIs. Do not become decisively engaged with the enemy's main defense and consolidate at CP 7 NLT 0600.

Concept of the operation:

We will move quickly in a company wedge, assuming risk to PL COWBOYS. We must make contact with VIPER ASAP and use him to assist us throughout the mission. We will set vic PL COWBOYS, BLUE will move quickly and begin to locate and destroy the DRT teams in zone. RED will move forward and destroy the CSOP in NAI C109. WHITE will move up and clear NAI C112. With the CSOP and DRTs destroyed, the enemy will not have eyes on our reconnaissance efforts tonight or our attack tomorrow. Then we will continue our reconnaissance and set FIST-Vs in OPs to observe AB0001 and AB0002. On order the engineers will breach the obstacle vic CP 8. NLT 0600, we will consolidate at CP 7 and conduct rearm and refuel operations. Then we will fall in as the trail element of the TF diamond when the TF passes our location at 0700 on the attack to seize OBJ YELLOW tomorrow morning.

Maneuver:

BLUE: You are initially the main effort. Lead company wedge to PL COWBOYS. Move quickly to CP 7, dismount, and conduct a hasty DRT sweep to clear NAI C110. Once this is complete, remount, and send one section and a FIST-V to NAI C113 and send one section to NAI C111. You must move quickly to take out the enemy's eyes. RED and WHITE will overwatch your mounted movement. Dismount your squads 1km south of each NAI and clear NAI C113 and C111. Use your dismounts to guide the FIST-V into a position vic 054555 oriented on NAI 109 to call fires on the CSOP. Once DRT sweeps are complete, establish a dismounted OP (OP1) vic 053563 to observe NAIs C103 and C104 and a dismounted OP (OP2) vic 122552 to observe NAIs C107 and C108. Use your vehicles to overwatch your dismounts as much as possible. Your vehicles are the company reserve. Keep them at REDCON 1 and be prepared to react quickly to FRAGOs from me. Leaving your OPs in place, start your move back to CP 7 NLT 0500. Consolidate at CP 7 NLT 0600.

THUNDER 14: Move with BLUE. Set vic 054555 oriented on NAI C109. On

order, adjust fires on the CSOP in C109. After destroying the CSOP, move to a position vic 046567 to serve as primary shooter for AB0001 and AB0002.

RED: Move on the left of the company wedge. Set COWBOYS. Follow and overwatch BLUE's move to NAI C113. Set vic PL OILERS. Once the FIST is set in a position to observe fires on NAI C109, move forward and destroy reported CSOP at NAI C109. Make contact with VIPER 2 on his net, and send a section to recover his vehicle. Have him guide you in, if necessary. If recovery is not possible, ensure that all friendly elements, including VIPER 5 (last reported to be near AB0002), are at least 2 km from targets. Send your other section with the XO to set PL RAIDERS and observe the obstacle reported by VIPER vic 074587. Determine if there is a bypass on the NE end. If there is no bypass, determine the point of penetration. Move as stealthily as possible, and do not become decisively engaged. Start your move back to CP 7 NLT 0500. Consolidate your platoon at CP 7 NLT 0600.

WHITE: Move on the right of the company wedge. Set PL COWBOYS. Follow and overwatch BLUE's move to NAI C111. Set vic PL OILERS. Once BLUE reports NAI C111 clear, you become the main effort. Move forward and clear NAI C112. Send one section and SAPPER 2 (engineer squad) to reconnoiter the point obstacle vic CP 8. Do not risk being compromised. Assess the trafficability of that avenue of approach for the attack. Bypass the obstacle and clear NAIs C107 and C106. Attempt to make contact with VIPER's B section and find out what happened to that element. Evacuate WIAs if necessary. Return to CP 8. On order breach the obstacle. Be prepared to leave that tank section and engineer vehicle on site to secure the area and keep that lane open. Have your other section set RAIDERS and observe NAIs C108 and C105 to confirm or deny presence of obstacles and vehicles. Position THUNDER 24 (FIST) in an OP vic 090573 to be the alternate shooter for AB0001 and AB0002. Start your move back to CP 7 NLT 0500. Consolidate your platoon at CP 7 NLT 0600.

SAPPER 2: Move with WHITE. On order, breach the obstacle vic CP 8. Be prepared to remain on site, secure the area, and direct traffic through the lane.

THUNDER 24: Move with WHITE. Set vic 090573 and orient on NAI C103 and C104. You will be the alternate shooter for AB0001 and AB0002.

WOLFPACK 5: Move with RED and supervise the effort in the west. Call the TF main and get retrans for our net.

WOLFPACK 9: Request that the TF immediately attach to us an additional engineer squad, two additional medic PCs, a fueler, and an ammo truck for this mission. They must move with us when we leave this location. Follow the company team's move and set the trains at CP 7. Conduct CSS operations from there. Conduct rearm and refuel operations at CP 7 NLT 0600.

WOLFPACK MG: You are the company team relay and battle captain. Move in my HMMWV with the trains. Ensure that you maintain communications with me and with the TF main. Keep accurate track of the battle and move to high ground as necessary.

I will move with WHITE. I need clarification on the enemy situation in the east. Keep me informed. What are your questions?

RATIONALE

The three keys to the success of this mission are:

1. Recognize that you can't do everything. You must clarify the TF commander's PIR. Time is of the essence, and your resources are limited. Seek guidance from higher and focus your reconnaissance efforts.
2. Fight the enemy, not the plan. You must quickly conduct a thorough IPB. Use reports from the scouts to update your sitemp. Plan off of your updated sitemp, not the original from the S2. Continue to update your running estimate of the enemy situation throughout the night and think from the enemy's perspective. Recommend a COA to the commander based on the information you gather.
3. Use all assets available. Continue to use available scouts to conduct reconnaissance and provide you with information on the enemy in OBJ YELLOW. Evacuate wounded scouts as necessary. Share information with reconnaissance assets from your adjacent units, brigade reconnaissance assets, etc.

After LOGPAC activities are completed, start your movement ASAP. Request clearer focus from the TF commander. You must request additional assets (engineer, medics, fueler, and ammo truck) in order to accomplish your mission and sustain your team. Once you complete your IPB, inform the TF commander that you believe that the enemy is weakest in the east and recommend that he begins developing a COA to attack in the east, to be executed pending the results of your reconnaissance. The reconnaissance information you gather and your recommended COA should provide him with sufficient information to make his final decision.

Sacrifice security for speed and assume risk in your movement to PL COWBOYS. Make contact with VIPER ASAP and use them to help you. If any scouts are still alive, you should be in communications range with them by the time you reach PL COWBOYS. If any scouts are alive, they have presumably been conducting continuous reconnaissance and surveillance since they lost communications with the TF main. They should have at least some new information that will help you. It is implied in your mission that you assume operational control of the scouts. Issue them a FRAGO to conduct detailed area reconnaissance of any unconfirmed NAIs in OBJ YELLOW and help you confirm your IPB. Ensure all scouts are at least 2km from preplanned targets and abandon disabled vehicles if necessary. Extract wounded scouts as necessary.

Clear DRTs to prevent them from observing your every move. Only dismounts will be able to clear the DRTs. Your mechanized infantry platoon is your primary means of dismounted reconnaissance. Use it to conduct DRT sweeps to quickly take out the enemy's eyes. If DRTs are not cleared, they will call fires to impede and harass your reconnaissance efforts throughout the night. Once it completes its DRT sweeps, BLUE sets in two short-term OPs (VISITS) to observe NAIs, provide redundancy for preplanned targets, and provide "reconnaissance pull" for the TF during tomorrow's attack. Use BLUE's vehicles to act as the company team reserve or quick reaction force. FRAGO them as necessary. Use BLUEs dismounts to guide in and set one of the FIST-Vs in a position to overwatch NAI C109 and adjust fires on the CSOP and other targets of opportunity to facilitate your reconnaissance. BLUE must move quickly because you must clear DRTs before moving any other elements north of PL OILERS. Otherwise you risk compromising your entire unit.

Destroy the CSOP confirmed by the scouts in NAI C109 with a tank platoon and indirect fire called by the FIST-V emplaced by BLUE. Clear C112 to ensure that there is not a CSOP there. This will leave the enemy completely blind

and allow you to continue your zone reconnaissance toward OBJ Yellow.

You must get eyes on the obstacle in the western corridor. This is where the TF commander currently plans to attack. If you cannot convince him to attack in the east, he will attack in the west as planned and expect you to provide him with the grid to the point of penetration where the obstacle is weakest.

Physically clear NAIs C106 and C107. If you can deny the presence of an MRP and obstacle there, you may convince the TF commander to attack there. With some further reduction by the engineers, the bypass on the north side of the point obstacle may be a viable avenue of approach for the attack tomorrow. Use of this avenue, if successful, would also serve to isolate OBJ YELLOW and prevent the enemy from repositioning forces from OBJ BLUE (east of OBJ YELLOW) into OBJ YELLOW.

Reconnoiter the obstacle at CP 8. Beware of enemy overwatching the obstacle. The enemy should have eyes on the obstacle. Be careful and do not risk compromising your forces and your plan. If possible, bypass the obstacle initially and clear C106 and C107. If the NAIs are clear, prepare to breach the obstacle at CP 8. Do not breach too early, because you may compromise your intentions and allow him time to replace the obstacle.

The scouts confirmed tracked vehicle noises at NAI C105, but they neither confirmed nor denied the presence of the templated obstacle in NAI C108. Use a tank section from WHITE and your vehicle to conduct mounted reconnaissance along the eastern mobility corridor. Use the standoff distance of your thermal sights to observe NA Is C108 and C105 to confirm or deny presence of the templated obstacle and MRP. Then set the second FIST-V in a position where it can observe the preplanned targets and provide redundancy as the alternate shooter. If you visually clear NAI C108 and deny the presence of an obstacle there, you will have further support for recommending that the TF attack in the east rather than the west.

Do not allow mounted movement north of PL RAIDERS in the central mobility corridors without your authorization, because, based on your IPB, PL RAIDERS is most likely the southern edge of the enemy's kill sack. Using this control measure will prevent friendly vehicles from driving into the enemy's kill sack and becoming decisively engaged by his main defense.

Reader's Solution

(Submitted by CPT Ray M. Ceralde, Korea)

TASK ORGANIZATION:

RED – 1st Platoon (Tank)

WHITE – 2d Platoon (Tank)

BLUE – 3d Platoon (Mech)

FRAGO: Delivered face to face with 1s, 4s, and attachments while CO/TM conducts LOGPAC activities, and briefing off a 1:50,000 map and a dry erase board.

Situation. Scouts conducted zone reconnaissance up to PL STEELERS last night. The task force has lost commo with them. However, these are the reports they sent back before we lost contact.

The scouts reported the following enemy activities:

- Two BMPs, stationary, oriented SSE at 076556, NAI C109.
- Three T-80s, stationary, in a hide position vicinity 079609, NAI C104.
- Tracked vehicle activity vicinity 100600, NAI C105.
- Enemy dismount activity vicinity 055591, templated strongpoint, NAI C103.

The scouts reported the following obstacles:

- Wire and mine obstacle consisting of triple-strand concertina, AT and AP mines. Oriented SW to NE starting from a difficult bypass at 059568 going NE for an unknown length.
- Wire and mine obstacle 074587 oriented NE to SW. This obstacle most likely ties in with the previous obstacle and both of them combined are probably an extensive turning obstacle.
- Point obstacle consisting of wire and mines with difficult bypass on north side at 119580. This obstacle is most probably blocking the gap at 120573.

I think that the enemy is defending the western avenue of approach (AA) as his main effort. His AT weapons are covering an extensive turning obstacle that will try to force us to go north and straight into the kill sack of an MRP or tank platoon vicinity 104. The AT fires will have flank shots on us as we go north to avoid the obstacle. The strongpoint is there to protect the AT firing line and force us to stay off the western ridge and keep us in the east to go into the MRP kill sack. The CSOP in 109 is intended to give early warning and to attrit us.

In the eastern AA, the scouts haven't seen anything in 112 so we can assume that the two BMPs in 109 are the CSOP for the MRC defense. The scouts probably haven't cleared 108, where there is a templated obstacle, but their report of tracked vehicle activity vicinity of 105 indicates that there is an MRP defending this AA. I'm pretty sure that 108 is the location of this MRP's kill sack. Since the MRC has put a great deal of effort into the turning obstacle in the west, I do not think that there is an extensive obstacle here.

The gap in the far east is blocked by a point obstacle. The scouts found a difficult bypass around it but I'm sure that somebody is overwatching this obstacle. It may be an MRP (-) or a single vehicle and they may have let the scouts through to prevent their detection and/or deceive us that this obstacle is not covered. This MRP(-) may be defending this obstacle vicinity the 1257 grid square oriented west or defending in 106.

The scouts haven't found any DRT teams, especially in NAIs 110, 111, and 113. I still think that there is one DRT team out there, however.

As far as the friendly situation goes, Viper 1 has been zapped and Vipers 4 and 6 made direct fire contact, and we haven't heard from them since. As of the last report, four scout vehicles are still alive with one requiring recovery at 044580. All of the scout vehicles are north of PL RAIDERS.

Our attachments are an extra FIST-V and an engineer squad. BLACK 1, take one of your FIST-Vs to go with RED and the other one to go with WHITE. BLUE 1, take SAPPER 12 (engineer squad) with you.

Our mission is to conduct a force-oriented zone reconnaissance to destroy enemy security forces and to recon point obstacles from PL COWBOYS to PL RAIDERS starting at 1800 in order to support the task force's reconnaissance effort.

My intent is that we are completing the scout's zone recon, not redoing it. There are plenty of tasks that we have to do, but I have prioritized the most important ones. If we can re-establish commo with the remaining scouts, our mission becomes much easier because the scouts can continue their recon up to PL STEELERS and provide us updated reports. The end state is that we have destroyed the CSOP, reconned the point

obstacle in the gap, identified the DRTs, cleared designated NAIs, and positioned the FIST-Vs ready to observe AB0001 and AB0002. Also, we are ready to fall in as the trail CO/TM for the TF.

At 1800, be at REDCON 1 ready to move out of here. We'll cross the LD in a wedge formation using the traveling overwatch method, with BLUE leading and RED trailing in the west and WHITE trailing in the east. CO trains will trail in the center behind RED and WHITE. I'll assume risk and sacrifice security for speed while moving up to PL COWBOYS. After crossing PL COWBOYS, be deliberate and cautious in your movement.

BLUE 1, set vicinity CP7 and send your dismounts to clear NAI 110 in order to deny DRTs the use of this key terrain. Also, I want you to try to re-establish commo with the scouts on their net. They may be simply out of range, and we should be close enough to contact them from here.

When 110 is clear, BLUE 1, split one section to go west with RED and one to go east with WHITE.

BLUE section and RED 1, you will conduct a raid on the CSOP at 109 to destroy it in order to deny the enemy from using his security elements. Here's my guidance. BLUE, have your section move toward CP D4. I want you to fix the CSOP from the support by fire position vicinity CP D4 to allow RED to destroy it. RED 1, talk to BLUE's section so they can guide you in to assault the CSOP. I will be with RED to control the action here.

RED 1, after you destroy all enemy in 109, move back to CP D1 to overwatch BLUE's section. BLUE 1, at CP D4, send your dismounts to clear 113 to deny DRTs use of this terrain. Once 113 is clear, keep your dismounts there. Their mission is to observe 103 and 104 to provide early warning if the enemy situation changes. BLACK 1, send one of your FIST-Vs to position vicinity 113 to observe AB0002. BLUE, keep your section in the vicinity of CP D4 and continue to overwatch 109 to ensure that it remains clear.

BLUE, send your eastern section to CP D3 and send your dismounts to clear 111 in order to deny DRTs use of this terrain. WHITE 1, overwatch BLUE's section in order to protect them. Once clear, take your dismounts back and move your section to CP D5 and clear 112. Next go to CP D8. SAPPER 12, recon the point obstacle to determine if mechanized forces can move through a breach if the TF commander decides to attack through here for tomorrow's attack. BLUE, your section will provide overwatch for SAPPER to protect them during their recon. Additionally, observe for any enemy forces guarding this obstacle.

WHITE 1, work and talk with BLUE's section and use bounding overwatch to cover their moves as they clear 111, 112 and the obstacle at CP D8. When 112 is clear, go to CP D6 and send the FIST-V to position on the ridge about 1 km west of CP D6 to observe fires on AB0001. Additionally, observe NAI 108 from CP D6 to see if there are any enemy or obstacles there.

BLUE and SAPPER, once you've reconned the obstacle, move back to CP D3 using a series of bounds to overwatch each other. WHITE, work with BLUE to cover their moves back. When BLUE is set at CP D3, move back to CP D2. BLUE and WHITE, from your positions, continue to overwatch NAI 112 to report any new enemy activity.

Here's the coordinating instruction for everybody. The TF commander wants us to consolidate at CP 7 once we've completed our recon. I think it's because he wants all available combat power in the AA the TF attacks. On order, move to CP 7 where we will consolidate. From there, we will fall in as the trail CO/TM in the TF attack.

BLACK 7, move the CO trains to CP 7 once 110 is clear. Request the FAS to move closer to CP 7 and request for an additional M113 attached to us for casevac. Request an additional fueler and ammo HEMMT to be attached to us for tomorrow's attack, and be prepared to conduct a hot refuel and rearm during tomorrow's attack.

BLACK 5, go in the east with WHITE to control the maneuver there. Keep attempting to make contact with the scouts. I assume that they already know, but remind them to be at least 2 km away from the pre-planned MLRS targets by 0600. For the scout vehicle requiring recovery, order them to destroy it if it can't move out before 0600.

I'll be in the west with RED. What are your questions?

RATIONALE:

Since the TF commander has issued vague guidance, and assuming that I cannot contact him for clarification, I would have to prioritize tasks and execute the most important ones. This is not disobeying orders but maintaining a purpose orientation. It is probably unrealistic to perform all the tasks, but some are important enough to support the TF commander's purpose, which is to enable the S2 to determine the enemy template.

My plan is based on the assumption that there are scouts still remaining and who can continue to perform reconnaissance. If I can re-establish contact with the remaining scouts, and they can continue their zone recon to PL STEELERS, they can execute the other half of the mission that the TF commander wants me to accomplish. Additionally, they can provide additional reports since the past day about what they have discovered that we do not know yet. If I can't contact the scouts or if they are all destroyed, I will continue the mission only to recon the areas that I don't have a good read on, such as NAIs 106 and 108.

Based on the scout's reports and making some deductions, such as about the turning obstacle in the west, the intel picture is over halfway complete. With that, I prioritized which NAIs we need to clear, what enemy to destroy, and what obstacles to recon to enable the S2 to confirm or deny the enemy template.

In order to gain a foothold, I need to clear NAI 110 first. From there, I have RED and BLUE conduct a raid to destroy the CSOP in the west. I have the BFVs guide the tanks in because they can locate and fix the CSOP, making it easier for the tanks to locate and destroy it. I use a raid for this operation because I do not intend to hold that ground; the enemy probably has a pre-planned artillery target there. Destroying the CSOP here will allow the TF to attack unimpeded.

In the east, I sent BLUE's other section to clear NAI 111 to ensure that there are no DRTs. I then have them recon the point obstacle because we need to determine if a breach through here will support the TF's attack. I did not send them past PL RAIDERS to clear NAIs 105 and 108 because I believe that this would put them in a suspected MRP kill sack.

When RED, WHITE, and BLUE had completed their missions, I positioned them just north of PL COWBOYS conducting a screen mission to allow them to continue observation but close enough to CP 7 to consolidate for tomorrow's attack.

The instructions I gave to the platoons were not extremely specific but I gave them enough guidance so they can execute using their own initiative. In situations where time is critical and there is minimal preparation time, initiative and clearly defined tasks and purposes are important to success.

New Electronic Information Systems Open a Virtual Library On-Line

As the Army moves into the rapidly changing world of digital technology, it can no longer afford to rely on paper-based training materials. Unit commanders must be able to tailor generic training materials to address their specific organizational structure, mission-essential task list (METL), training schedules, and resource constraints. Similarly, "schoolhouse" training and doctrine developers must be able to revise materials rapidly so that training programs can be fielded concurrently with new systems and procedures.

To facilitate these requirements, the Army has developed several systems that provide users the latest updates on the tasks they train and the equipment they use. Each of these systems interfaces with the others, either directly or through another, to allow instant transfer of information between databases.

Standard Army Training System (SATS)

SATS gives unit commanders and training managers a user-friendly, computer-based, automated training system to enhance the planning, resourcing, and assessing of unit training. SATS automates the training management doctrine found in FM 25-100, *Training the Force*, FM 25-101, *Battle Focused Training*, and FM 100-5, *Operations*. It provides unit commanders with the tools to: (1) Develop training plans, METLs, calendars (three-dimensional), and schedules; (2) Tailor ARTEP Mission Training Plan training and evaluation outlines (T&EOs) to fit the unit METL; (3) Design training exercises and calculate resource costs; and (4) Assess training and generate readiness reports. The Army Training Support Center at Fort Eustis, Va., fields SATS and provides training and technical support. To learn more about SATS, go to its web site at *http://www.satsbbs.com.*

Automated Systems Approach to Training (ASAT)

ASAT is a training development database used by proponent schools to develop doctrine, ARTEP Mission Training Plans, Soldier's Manuals, training support packages, and Combined Arms Training Strategies (CATS). Each proponent school maintains its own ASAT database where local training data (e.g., specific to resident courses) and proposed training products are stored. When training products are approved for Army-wide distribution, they are uploaded to another database called TEXMIS (see below). The Army Training Support Center provides training and technical support for ASAT. For more information about ASAT, check out its web site at *http://www.atimp.army.mil/asat/.*

Army Doctrinal and Training Digital Library (ADTDL)

The ADTDL is an Internet web site containing hundreds of approved doctrinal and training publications. It contains field manuals, training circulars, ARTEP Mission Training Plans, training support packages, and much more, although it *does not* contain technical manuals. Users can view publications on the Internet or download and print them. The ADTDL offers searching capabilities, so that one could find all publications that address a topic such as cavalry security operations. You must register on-line to receive a user ID and password to access publications with limited distributions. The Army Training Support Center manages the ADTDL. To learn more about the "Library Without Walls," go to the ADTDL web site at *http://155. 217.58.58/.*

TRAMOD Executive Management Information System (TEXMIS)

TEXMIS is an Army-wide database that serves two major purposes: (1) It contains doctrinal and training information that can be downloaded and imported into ASAT or SATS; (2) It functions as a "warehouse" for proponent schools who want their doctrinal and training products to be available on the ADTDL. There are several significant differences between TEXMIS and the ADTDL. Refer to the table below to determine when to use which one. You must register on-line to receive a user ID and password in order to use TEXMIS, which is managed by the Army Training Support Center. To learn more about TEXMIS, go to its web site at *http://155.217.35.201.*

U.S. Army Publishing Agency (USAPA)

Some publications are not yet available in TEXMIS and the ADTDL. The only way to acquire those publications is by ordering them through the USAPA web site at *http://www-usappc.hoffman.army.mil/.* This site also contains an extract of DA Pam 25-30, which lists the latest dates and change numbers for all doctrinal, training, and technical publications.

The Army continues to produce upgraded equipment, devices, and procedures during its move towards digitization. Training developers continue to update TSPs and MTPs faster than the printed manuals reach the units in the field, but all changes are available through these present databases. By utilizing these systems, either independently or in conjunction with each other, the Army's trainers can streamline their planning process, increase efficiency, update their training methods, and share breakthrough ideas. Combat units can take advantage of the technology provided to modernize their training, ensuring they afford their troops with the most current training available.

To learn about how these automation tools are employed at the U.S. Army Center, go to the web site for the Analysis & Training Development Automation Branch, Directorate of Training and Doctrine Development, at *http://147.238.100.101/dtdd/atda1/home.htm.*

Action	TEXMIS	ADTDL
You want to look at the contents of an MTP, Soldier's Manual, or other training product.	You cannot view the content of a training product without downloading it first.	Use the ADTDL; you can view the contents directly on the Internet.
You want to download an MTP into SATS so you can tailor the T&EOs.	Use TEXMIS because you can import the T&EOs directly into SATS without any typing.	You could use the ADTDL, but you would have to cut-and-paste the T&EO, piece by piece, into SATS.
You want to find all training products that address a specific task or topic.	You could use TEXMIS if you want to find a task and download into SATS or ASAT. However, you cannot search TEXMIS for specific topics.	Use the ADTDL if you want to search for a topic or do not want to download task data into SATS or ASAT.

Author's Recipe for Fixing Personnel Problems Doesn't Attack Army's Core Weaknesses

The Downsized Warrior, America's Army in Transition by David McCormick, New York University Press, New York, N.Y., 1998. 268 pages, $24.95 (hardback).

In the realm of articles and books which address new doctrine, tactics, and organizations on the digitized battlefields of tomorrow, this book addresses the cultural foundation of the Army, its officer personnel system. Whether the Army's drawdown worked will not be known until the next real war (but is being seen currently at the National Training Center). But David McCormick's *The Downsized Warrior* reveals troubling signs among the Army's 65,000 commissioned officers. Yes, the Army learned from the last several drawdowns, which followed the Korean and Vietnam Wars, and executed the "build-down" more efficiently. But condensing a Cold War army without restructuring a personnel system designed at the end of World War II left a dispirited officer corps. As a result, an already rigid Officer Personnel Management System (OPMS), designed to support the Defense Officer Management Act (DOPMA) of 1980, leaves officers, particularly commanders, more concerned with surviving the bureaucracy than surviving the battlefield.

For officers who enjoy reading only battle essays and dramatic acts of leadership under fire, this is a hard read. But, it must be read and reread if officers are to understand how the "system" works. McCormick opens the door on a process few of us have had the privilege to view. The professional value of this book far outweighs its modest price of $24.95. I highly recommend it to everyone's professional reading list in order to understand the impacts of military culture on military effectiveness.

The author, a West Point graduate and former Engineer officer who served with the 82nd Airborne Division in the Gulf War, concludes: "Morale within the officer corps has greatly declined as a result of downsizing, as have career expectations. The officer corps as a whole is less committed to the Army and the military profession than it was before downsizing began." He explains the complexities behind the latest problems with the officer corps as no one has since Colonel William Hauser (USA, Ret.) did in the late 1970s, 1980s, and early 1990s. McCormick's book disputes the claims by many senior officers that the drawdown has only highlighted careerism and that it will subside after the drawdown is over. McCormick counters this excuse by using the drawdown as a catalyst that exposes larger flaws in the Army's officer personnel system and the laws that bind the "system."

He quotes an unnamed captain as saying, "At Fort Bragg, captains didn't cooperate at all. It's become so competitive ... I've seen captains do each other in. They would catch someone doing something, not illegal, but a judgment call, and they'd say, 'Hey, I'm going to slam him by telling the boss.' And they did." A major at Fort Hood, Texas, adds, "I see a lot more competitiveness among majors and a lot less cooperation." To reach these painful points, and support his thesis, McCormick has conducted research where he analyzed hundreds of primary and secondary sources that deal with both the officer corps and society's impacts on how the Army conducts its personnel business. He also interviewed hundreds of officers impacted by the drawdown, and hundreds of other personnel, including former Chiefs of Staff of the Army, who have been behind the scenes of personnel actions or directly involved with the drawdown's planning and execution.

He paints a thorough picture on how Army senior leaders painstakingly and compassionately approached the hard mission of cutting the Army following our victory in the Gulf War. But the Army leaders weren't fault-free. The then-Chief of Staff at first reacted slowly to Congressional demands for a "peace dividend," and offered up few cuts or new force structures that would justify existing strength. The Army, which has the reputation of being notoriously bad at legislative relations, again found itself under a barrage of floor speeches calling for deeper reductions.

When the Army finally woke up, it found Pentagon civilians under Defense Secretary Dick Cheney already mapping the service's future force structure. At this point, the Army became more a manager of the drawdown than its chief executive officer. With its centralized personnel system, it was very good at this, with detrimental impacts to officer professionalism. In sum, civilians set overall strategy and the Army sweated the details. Again, this was something the Army was good at; it has a long historical tradition of "pursuit of meaningless details."

The climax of the book is McCormick's attack on the Holy Grail of the Army, its officer personnel management system. The system was built, designed, and sustained by the senior ranks to support the "up-or-out" promotion system, with traditions that stem from World War II and George C. Marshall's view of the officer corps in the future. Specifically, McCormick conducts an all-out attack on the OPMS studies of 1971 and 1983, and says, with a little insight into our current new OPMS XXI system, "If past history is any guide, however, we might expect to see a relatively conservative set of recommendations that do little to challenge the status quo."

He addresses the Army's fascination with themes like a "vigorous and youthful officer corps" and the "generalist" reasoning that results in moving officers through numerous assignments for short periods of time. These traditions are based on the mobilization problems experienced by the Army at the start of World War II, when there was a small officer corps and no plan for expansion into a force structure that would support an army to fight a global conflict.

McCormick also touches upon, but not in detail, the negative effects of another tradition born in World War II, the Army's maintenance of a larger than necessary officer corps. Again, only William Hauser and some academics have challenged the Army's rationale at undercutting readiness by keeping so many officers in peacetime. McCormick points out in detail that, over the last decade and through the next decade, officers are gaining less and less experience in jobs that will demand critical decisions in combat. A significant example is the average time officers are serving in battalion positions such as company commander, operations officer, or executive officer, prior to becoming a battalion commander (the average is 54 months in a 16-year career). This comes at a time when the Army is embracing information technology that calls for experienced officers to assimilate and digest massive amounts of information, and then make a decision on a 24-hour-a-day future battlefield.

McCormick also addresses the impacts of the Army's "rigid" management system on officer education. He discovered the drawdown fostered an "anti-intellectualism" (it's actually been a tradition, stemming from officer resistance toward the first proposal to use examinations in order for officers to enter the School of Artillery and Cavalry (prelude to C&GSC) at Ft. Leavenworth in 1888). It has been a tradition in the Army to place officers in career-ending jobs in Army educational institutions, such as Fort Leavenworth and West Point. The Army forced military instructors and professors to retire. Command and General Staff College became known as "SERBia" — a mocking reference to the Army's use of selective early retirement boards, or SERBs, to cull the force of officers. McCormick reports that in 1992 alone, the Army forced 28 lieutenant colonels, a "substantial portion" of the faculty, to retire. The same occurred to ROTC

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USAREUR's Desert Storm Account Lacks Objectivity, Lessons Learned

From the Fulda Gap to Kuwait: U.S. Army, Europe, and the Gulf War by Stephen P. Gehring, Center of Military History, Washington, D.C., 1998. 377 pages, maps, illustrations, tables, and appendixes. $17.00.

While much has been written on the subject of the Gulf War, very little study has been devoted exclusively to USAREUR's (U.S. Army, Europe) involvement in the conflict. Stephen P. Gehring, the staff historian for USAREUR, attempts to provide this information in his new book, which serves as an echelon-above-corps look at USAREUR preparation, deployment, and redeployment for the Gulf War.

Gehring starts his history before the Iraqi invasion on 2 August 1990, beginning with the late 1980s arms reduction agreements and the drawdown of forces in the European Theater. He catalogues both the planning and execution used to cut back forces in order to meet treaty agreements, and later the so called "peace dividend" from the collapse of Communism. In the midst of this chaos, Gehring argues that senior USAREUR leaders, namely General Crosby E. Saint (the CINCUSAREUR), successfully restructured their forces to form more mobile, offensive units called "Capable Corps." This restructuring appears to be in line with the AirLand Battle concept espoused during the same time period. Gehring believes that this edict revolutionized USAREUR forces and made them able to execute their mission during the Gulf War.

In the midst of this drawdown, Iraq invaded Kuwait. Gehring lists and discusses USAREUR's participation in Desert Storm, focusing primarily on logistical support and deployment. He covers early involvement, such as piecemeal deployments (12th Aviation Brigade), deployment of individuals in required/shortage MOSs, deployment of reserve crews, supply shipments, and shipments of equipment (M1A1) drawn from war reserve to upgrade deploying CONUS units.

Gehring then covers the political grandstanding and discussions which led to the decision to give CENTCOM an offensive option by deployment of a USAREUR corps. The decision-making process to determine which units would deploy is explored, but not critically. Due to many conflicting requirements (post-drawdown end state in Europe, maintaining base security, attempting to keep unit integrity), units that deployed were often patched together and were not fortunate enough to have habitual training and working relationships.

Very little study is actually dedicated to the tactical operations during the ground war. A scant six pages are all the attention that is given to this subject. Instead, the author moves on to postwar redeployment operations. The complex issues of what equipment would be returned to Europe, what would stay in CENTCOM, and what would return to CONUS required extensive planning in order to meet another multitude of conflicting demands (treaty limitations in Europe, our allies' reluctance to allow permanent bases on their soil, and an overriding attempt to save money). He concludes the book with the programs intended to increase the morale of individual soldiers after their return (such as opening the Berchtesgaden resort).

I would not recommend this book, for several reasons. First and foremost, the book lacks any semblance of objectivity. The book completely supports USAREUR decisions, and shows the righteousness of USAREUR policies. At times, it almost sounded like propaganda. To make matters worse, there are almost no criticisms or discussions of mistakes that were made. It is a shame that in such a large operation as USAREUR's participation in Desert Storm, we cannot criticize ourselves to learn from our mistakes so that we will not make them again. If you are looking for an evenhanded or fair AAR, this is not it. Instead you will find what reads like a self-congratulatory press release from USAREUR.

Additionally, as previously noted, this book covers mostly subjects at echelons above corps. Very little time is dedicated to where the rubber meets the road, at battalion level and below, where soldiers and junior leaders make operations happen. The book discusses corps, divisions, and brigades, but rarely talks about individual battalions. The book is written at such a high level that, unless a reader is serving on a division or corps staff, very few relevant lessons can be gleaned from its pages.

Although not necessarily a fault, the book is somewhat deceptive in its title. Topics discussed are primarily the preparation, deployment, and redeployment. Actual combat involvement is not studied closely.

The book is not an easy read, as much of the presentation is dry and lifeless. The book is statistic-heavy with many charts and graphs, and lacks first person accounts of events. Adding some primary source material from actual soldiers and leaders who carried out the operation could have spiced up the book, but they are notably absent.

On the other hand, the book is well researched and prepared. It is obvious that extensive historical work went into gathering and synthesizing information from that time period. Many archives, unit histories, and official documents have been dissected to provide data. The actual deployment order for USAREUR is included in the book as an appendix. The author has done a good job cataloging what actions must be accomplished for a large scale deployment, and number crunching exactly what USAREUR did to make the deployment happen.

Unfortunately, because of the large bias and lack of self-criticism, I cannot recommend this book. I feel that the author passed up a great opportunity to let the Army learn from any mistakes which happened during USAREUR's deployment. Instead, the book ignores any failures and only highlights the successes of the operation. This is not the way the Army should write its own history.

CPT FRANK SOBCHAK
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Death Traps: The Survival of an American Armored Division in World War II by Belton Y. Cooper, forward by Stephen E. Ambrose; Presidio Press, 1998; 324 pp., $28.95 ($26.05 via Barnes and Noble); ISBN 0-89141-670-6.

Most armor aficionados have seen the movie "Kelly's Heroes," and the adventures of the anachronistic Oddball and his crew. One of the more memorable scenes in the movie finds Clint Eastwood, as Kelly, running into a relaxed Donald Sutherland who is "catching rays" while his crew feverishly works on the tank. Eastwood asks if he is going to help them. The answer? "No, man, I don't know what makes 'em work, I just ride in 'em."

The same cannot be said for Belton Cooper. Fifty-four years ago, as a lieutenant, Mr. Cooper served as an ordnance liaison officer with Combat Command B of the 3rd Armored Division during its combat in northern Europe. He got to see a good portion of France, Belgium, and Germany over the hood of a jeep tearing along rutted roads as he sought out damaged or broken-down tanks in need of repair. Since 3AD had bypassed many pockets of German troops, this was an incredibly hairy task, but one absolutely critical to the ability of the "Spearhead" division to do its job. As an alumnus of the 3rd, I eagerly awaited this book coming out since I heard of its release date last June, and the wait and the book have both been worth it.

The picture Mr. Cooper presents here is a very personal but very precise tale of the ef-

forts needed to keep an armored division moving in heavy combat. There has never been anything like it before or since, and the tale is of great worth to those who do not understand either the sacrifice of the past or the effort required to permit our predecessors to make that sacrifice. The tale which is told here is of one where it is not minutes of sheer terror, but day after day of fear, drudgery, and horror, overcome by determined men to make sure the tanks would roll forward.

Mr. Cooper is a very polished writer, and the book is very readable. But there is a certain quality of "you are there" many other memoirs do not seem to have. Part of it is the fact that there are a number of technical errors in it, but in the case of this book, they actually enhance the tale being told. These errors are not those of a man who has not done his research, but reflect the "rumor control" effect so many of us are familiar with, but in its 1944 version.

Case in point: the lack of a good, mobile, well-armed and well-armored tank. Mr. Cooper gives the field view of the stupidity and "branch blinder" mentality which held up 90mm-armed tanks, putting a sharp stick in the eye of the image of General Patton as he does so. But he writes that the M26's "Christie" suspension made it a much better tank. Elsewhere, he correctly notes that the Pershing had a torsion bar suspension, not a Christie suspension. (J. Walter Christie, an eccentric if there ever was one, created a long-travel coil spring suspension laid out at sharp angles inside a false hull. This did permit the tanks to go very fast over rough ground, but copyrights and lack of a perceived need caused the U.S. Army to purchase only seven Christie tanks. Christie sold his designs to Britain and Russia, where they influenced the suspensions on the T-34s, SU-85s and SU-100s, and the British Covenanters, Crusaders, and Cromwells. But Christie's design was not involved in the success of the M26.)

Cooper does provide some very interesting insights as to one of the classic "Gotterdammerung" pictures of WWII, the one that shows a German Panther burning in front of Cologne Cathedral. A 3AD M26 had picked it off with a shot on the move right after the German tank had just knocked out a Sherman. He includes four photographs from his own collection of the tank being knocked out, and the burned-out hull days later. He also provides the only known description of what he calls the "M26A1E2" or Super Pershing, better known formally as the T26E4. This tank, the only guaranteed Tiger II killer to ever be shipped to Europe, did actually fight one engagement, vaporizing an unknown German vehicle at 1500 meters (due to snipers, nobody wanted to go find out what it killed!)

Regardless of branch or interest, this book provides a very exciting, and in some cases moving, description of the background effort it took to permit units like 3AD to become the legendary formations of WWII. Nothing in recent times — ridge-running in Korea, firebases in Vietnam, or even the 100 Hours of Desert Storm — pressed the ingenuity and resolve of American troops and their support personnel like WWII. This book lays this out better than any other recent effort, and should be part of the library of any contemporary warrior, be he "heavy" or "light."

The saying of "Amateurs talk tactics, professionals talk logistics" is personified in this book.

STEPHEN "COOKIE" SEWELL
CW2 (Ret.)

The Changing Face of War: Learning from History edited by Allan D. English, McGill-Queen's University Press, Montreal & Kingston, London, Buffalo, 1998, 293 pages, $45.00 (Canadian), ISBN 0-7735-1723.

"Learning from history" is a challenge that most *ARMOR* readers must face at some point in their development as military professionals. "*The Changing Face of War*" is a collection of essays by Canadian army, air force and navy officers, the product of a course in war studies considering the impact of strategic ideas on the conduct of warfare.

With such a "joint" student body, it should be no surprise to find a range of results in their reports. Six papers deal with the evolution of strategy from the Napoleonic Wars to the present. Five studies are about unconventional warfare. Five additional pieces take the lessons of history into the 21st century.

The essay that perhaps is of most interest to the *ARMOR* community is titled, "The Myth of Manoeuvre Warfare: Attrition in Military History." The author's thesis is that "manoeuvre-based fighting...or other stratagems to making fighting less costly is something to be pursued at the tactical and operational levels. At the strategic level, he argues that attrition determines the outcome between roughly evenly matched opponents.

In view of the recent *ARMOR* article on Soviet tank design and the ongoing series on U.S. Cold War MBT development, "An Example of Force Development: Tukhachevsky and the Soviet Art of Deep Battle" is probably of topical interest to readers. The author of this piece, when he wrote it, was a member of the Canadian Forces' Force Development staff.

For those involved in preparing for SFOR, "Eliminating the Shadows: Applying Counter-insurgency Doctrine to Peacekeeping" may stimulate useful ideas. As a veteran of seven different United Nations missions, in my view this essay only serves as a start point.

While the title "Stealth Technology: A Revolution in Air Warfare" appears to address strategy primarily of interest to the air forces of the world, in fact the role of technology in changing the conduct of war, raised in this article, has to interest all those whose branches are based on technology.

This book provides a broad range of Canadian examples of attempts to learn from the history of military ideas in the strategic sphere. The contents serve as a source of inspiration for readers facing the need to put pen to paper in their own personal struggles to understand the past and it's meaning for the future of their profession.

ROY THOMAS
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Fighting for the Soviet Motherland: Recollections from the Eastern Front by Dmitriy Loza, edited and translated by James F. Gebhardt. University of Nebraska Press, 1998. 271 pages. Cloth price: $45.00. ISBN: 0-8032-2929-1

Fighting for the Soviet Motherland: Recollections from the Eastern Front is a first-hand account of the Great Patriotic War as lived and fought by a highly decorated Soviet tanker, Colonel Dmitriy Loza. Colonel Loza is a Hero of the Soviet Union, the USSR's highest designation for bravery, and a witness to some of the harshest fighting on the Eastern Front. Drawing upon both his own experiences and those of comrades, Colonel Loza has fashioned a memoir that offers both value as an historical recollection as well as a digest of lessons applicable to today's armor soldiers.

Loza's description of mounted warfare is consistently gritty, hard-hitting, and absolutely convincing. He is clearly an expert at his craft, a professional officer who always notes with particular carefulness matters of life and death on the battlefield. In particular, anyone interested in the performance of Sherman tanks will enjoy Loza's commentary. He covers everything from ammunition stowage, to maintenance, to armor characteristics, to the vagaries of fighting the tank under a wide range of conditions.

Throughout, Loza writes with studied detachment, yet with the conviction that the Red Army was engaged in a noble fight against the Germans. Loza's tales of the imperatives of combat are thus boldly adopted and consider few subtleties regarding conduct by soldiers and units in war. This is nuts-and-bolts history; analysis is left to the reader. What conclusions Loza does draw are straightforward and pragmatic. He is most interested on the one hand in the comradeship and brutality that transpired before his eyes, and on the other, the performance of men and equipment that he encountered along the way.

Of special interest is Loza's discussion of the entire range of tactical military activities, not just combat scenarios. Loza fully covers numerous logistical matters: food preparation and delivery, maintenance procedures, the practices surrounding burial of the dead, promotions, and even the delivery of field mail. This is the kind of detail that can only come from a veteran who has experienced such combat, and is the strong suit of the book. Loza even discusses his experiences against

the Japanese in 1945, an aspect of World War II almost entirely overlooked by most accounts of the period.

While the book is replete with such insights, the reader is forced to search for them to the extent that the overall value of the work is diminished. The power of Loza's commentary is hindered by a poorly organized format. The book contains 31 separate sections, each which describes a vignette and is presented topically. There is no situational context provided for any of the sections. Loza merely begins with his reminiscences leaving the reader striving to understand the setting. While each section has a title, they are so vague as to be impossible to decipher without turning to that section and scanning the text. Any sense of chronological order is likewise absent. Back-to-back sections may discuss events years apart in time, only to return again later to the earlier period. The text does not even specifically state the units in which Loza served, although the reader can infer that these included the 233rd Tank Brigade and 46th Guards Tank Brigade. Furthermore, the maps that are included are not related in any way to the body of the text. While capably rendered, the reader almost encounters them by accident midway through the work. Had the translator and editor, James F. Gebhardt, provided more in the way of context, the utility of this book would have been greatly enhanced. As it is, the trauma and realism embedded within Loza's account risks being lost as mere trivia.

Military historians and modern-day tankers alike will appreciate the richly detailed accounts of ground combat included here, although one wishes the valuable information within the text was more accessible. Nonetheless, Colonel Loza's description of fighting on the Eastern Front ultimately constitutes a riveting story that communicates war as a desperate clash of machines and of men. In one section he discusses combat awards and offers what is a fitting summary to his memoir as a whole:

Every decoration of a frontline soldier represents a battle, sleepless days and nights, serious wounds or light ones. These decorations are reminders of those long-ago fiery years, of our youth that was tempered by war.

CPT BRADLEY T. GERICKE
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The Minuteman: Restoring an Army of the People by Gary Hart, The Free Press, New York, 1998. 188 pages, notes, index. $23.00, ISBN 0-684-83809-5.

In *The Minuteman: Restoring an Army of the People,* former Senator Gary Hart makes a controversial proposal to replace a large portion of the active force with a well-trained, civilian-based reserve. The benefits of establishing a "true militia," he argues, would include greater coordination and solidarity between the active and reserve components, taming of the powerful military-industrial complex, and a reduced defense budget which would allow the attainment of the promised "peace dividend."

Drawing from his experiences as a former member of the Senate Armed Services Committee, Hart claims that the current force structure is incapable of meeting America's security needs in the next century. It is too dependent on expensive, high-tech weapons, and is unable to deploy in a reasonable amount of time to hotspots around the globe. By organizing the active army into smaller, highly mobile units capable of undertaking decisive action, the United States would be able to quickly achieve its military goals. Additional forces, if needed, would be provided by the reserve components.

By increasing the role of the reserves, Hart claims that the National Command Authority would be less likely to commit American soldiers to troubled areas if the operation required the mobilization of the reserves. This, however, would require a major change in how American troops are currently utilized. In order to continue long-term commitments such as Bosnia, and recurring operations, such as Haiti and the MFO in the Sinai, reservists would have to be mobilized not only for the operation itself, but also for an intense train-up period. Although hundreds of reservists are currently deployed to such areas, the proposed cuts of the active army made by Hart would require a drastic increase in both the number of reservists activated for federal service and the length of time they are mobilized. Hart fails to address the economic and political ramifications of increasing the reliance on the reserve components for operations not directly relating to a national security threat.

Hart only touches the surface in addressing the historic animosity between the regular and reserve components. He too quickly dismisses Emory Upton's classic writings concerning the importance of a full-time, professional army, describing the nineteenth-century National Guard as a group of misunderstood, underutilized semi-professionals in search of guidance from their active counterparts. Not only did Upton analyze national military policy, but he was also instrumental in developing infantry tactics that utilized the principle of maneuver. Additionally, Upton proposed a system of military schools based on the German model and wrote the first definitive military history of the United States. Upton's writings, although skewed in areas, were not the *unsustained,* vindictive slurs against the National Guard as Hart suggests. They were based on the performance of citizen-soldiers during the Civil War. Furthermore, it was a "skeleton force" in true Uptonian fashion, not an army of citizen soldiers, which was able to absorb the millions of new troops at the outbreak of the Second World War.

Throughout the book, Hart illustrates several critical, albeit obvious, shortcomings in today's military. He addresses the need for more strategic air and sealift, warns us of the danger of "mission creep," and predicts that terrorism will be a major threat to our national security. While these are important topics, the author contributes no original thought to them, and they distract the reader from the book's main point.

Despite serious shortcomings in historical research and the author's failure to provide the reader with a viable solution to identified problems, this extended essay is a worthwhile read. It will surely stimulate discussion concerning the future role of the reserve components, but it does not significantly contribute any new insight into that role. Therefore, a prospective reader should wait until next year to purchase it when the book appears on the reduced-price table.

STEPHEN M. GRENIER
CPT, Infantry

Downsized Warrior

(Continued from Page 58)

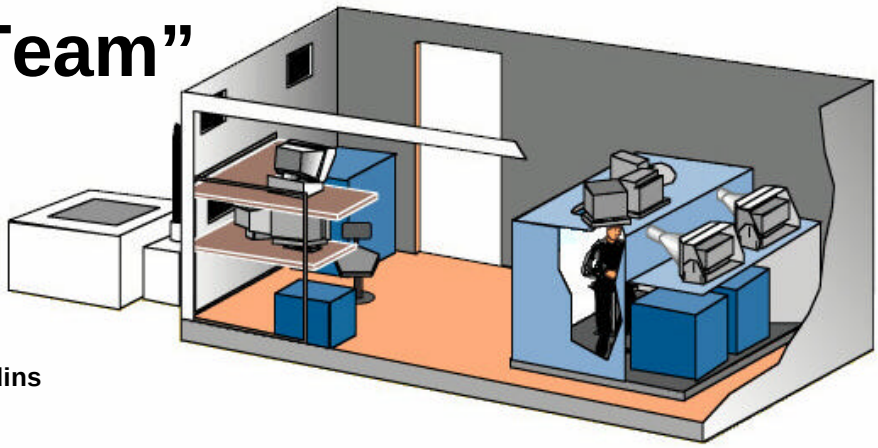
instructors, who found themselves booted off college campuses, as well as officers assigned at the War College and the Combined Armed Services School. The result is that the officer corps has fallen back to more "traditional muddy boots career patterns." This will have a long-lasting impact on the Army as generations of officers avoid academic assignments, opting instead for short-term career satisfaction.

"Morale, career expectations, and organizational commitment within the officer corps have fallen, careerism has risen, and initiative has declined in the post-Cold War Army," says McCormick, as he offers proposals that go beyond those recommended under the label of OPMS XXI. However, they fall short of the type of revolution that is necessary to create a professional officer corps for the future. His recommendations include "flexible career patterns" and an end to anti-intellectualism by allowing officers to attend more schooling. He mentions nothing about reducing the size of the officer corps in relation to the force, based on historical models, nor the necessity of combining officer policies with a personnel system that promotes unit cohesion.

What McCormick discovered may be insolvable with the type of evolutionary reforms the Army has attempted to use to "cure" its officer problems. The Army, with its individual focus, summed up in the "be all you can be" phrase, maintains that the only way it can attract sufficient numbers of young men and women is to promise them professionally satisfying lives, complete with rapid promotions, travel, a subjective evaluation system that demands less than competence, and more education. When you recruit based on careerism, we should not be surprised if more officers are putting resume ahead of country.

MAJ DONALD VANDERGRIFF
Duke University

AGTS Deploys With "First Team" To Bosnia!



by Trudy Ryan and Major J.B. Iddins

The Advanced Gunnery Training System (AGTS), the U.S. Army's state-of-the-art gunnery trainer, continues to meet expanding training requirements. Normally stationed at CONUS locations, two of the M1A2 trainers were sent to Bosnia in late November in support of 1st Cavalry Division (1CD) troops during their deployment. The AGTS will sustain the gunnery skills of M1A2 crews who man M1A1 tanks while deployed to the Balkans and reduce or eliminate remedial training after completion of the mission. AGTS has proven it can develop and sustain individual, crew, and platoon precision gunnery skills to a proficiency level that permits rapid transition to live fire training or combat gunnery.

AGTS can be configured to meet the user's training needs, and can support institutional, unit, and deployed training situations. The AGTS configuration being deployed to Bosnia can be relocated easily. It has a self-contained shelter and environmental conditioning unit, and is flexible enough to accept power from a variety of sources, in this case a military power generator.

Currently there are three platoons of M1A2 AGTS: at Ft. Knox, Ft. Hood, and Ft. Carson, each with prebrief and after-action review (PAAR) capability. The AGTS was fielded early to each location, even before M1A2 tank fielding, so it could be effectively utilized during New Equipment Training (NET). Seven M1A2 AGTS systems now in production include SEP capability, and are scheduled for delivery to Ft. Hood, Texas, beginning in March, 2000.

The two AGTS systems bound for Bosnia were to fly from Kelly AFB to Tuzla AFB, Bosnia, on a C-17 aircraft. They will be stationed at Camp McGovern and Camp Bedrock for one year. Personnel from the Army's Simulation, Training and Instrumentation Command (STRICOM) have been in theater to conduct site surveys and arrange logistics support. The systems will be installed on a bed of railroad ties on level ground in lieu of concrete slabs. Contractor Logistics Support (CLS) will be provided by AAI/ESI, the same contractor for CONUS trainers. Qualified electronics technicians with extensive AGTS hands-on experience will be co-located with each trainer to provide high operational readiness.

At present, 1st Cavalry Division is the only division in the Army fully equipped with the M1A2. According to MSG Tim Dodge, Master Gunner for 1CD, "Given the fact that the division deployed two battalions of M1A2 tankers to an area of operations which is equipped only with M1A1 tanks, the logical conclusion was to deploy the AGTS to sustain the exceptionally perishable M1A2-specific skills. Additionally, the First Team is deploying other necessary Training Aids, Devices, Simulators, and Simulations (TADDS) to keep the soldiers well trained on a variety of weapon systems." AGTS stands ready to support the armor soldier wherever he may be deployed.

Trudy Ryan is the hardware engineer for the AGTS program at STRICOM (PM Trade). She is currently the co-chairman of the AGTS Crew Station/Mobility System Integrated Product Development Team. She has 13 years experience working on STRICOM simulation projects. Ms. Ryan holds two BS degrees in engineering from the University of Miami.

Major J.B. Iddins is the project director for AGTS at STRICOM (PM Trade). Major Iddins is an Armor officer and a member of the Acquisition Corps. He holds a BS degree in education and a masters in information systems management. He is a 1998 graduate of the Army's Command and General Staff College.