

ARMOR

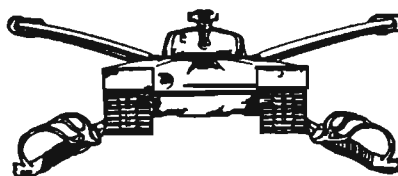


TANK WARFARE, BALKAN STYLE



I had an interesting discussion the other day about what the Army should name the new Armored Gun System (AGS). Should it be the Forrest? Should it be the Polk? One interesting suggestion was not to name it after an individual at all — just call it the Dragoon — since it is likely to serve a function reminiscent of a combination of infantry and armor cavalry support. I'm sure that the annointed namers echelons-above-Brewer will come up with something creative and historically significant, but the discussion did serve to bring up one nagging cart-before-the-horse. Maybe, just maybe, we ought to figure out what we're going to do with it before we get too worried about what we're going to call it.

Having spent some time in the Sheridan battalion of the 82d Airborne Division in the early '80s, I saw what can happen when light reconnaissance vehicles are forced to masquerade as tanks and are employed as portable pillboxes spaced a click apart. We've learned some things since then, but I fear the AGS may suffer a similar fate if not preceded by a clear understanding of its strengths and limitations. It may surprise some (but no tankers I know) to learn that not everyone understands how to use the armor we have now. I recently got a request to reprint one of our articles in the post-wide publication of a major



FORSCOM installation and they asked us to tell them what the abbreviations "MBT" and "APC" stand for! When the AGS rolls off the production line, we need to have fully thought through how it will be employed. That means doctrinal manuals, field trials, battle lab simulations and some creative NTC rotations just to work out the bugs.

I recently told a young lieutenant that if I were in his shoes, and I wanted to be on the cutting edge of technology and tactics in the late 1990s, I would set my sights on commanding an AGS company after attending the Advanced Course. Given the trend in world events, e.g., the draw-down, the lightening of the armor force, the propensity for low-intensity conflicts (LIC) that will require rapid force-projection, stabilization, and follow-on by heavy forces, AGS is bound to figure significantly in the battles of the latter part of this decade.

So if you've got some ideas on how and what AGS should do, see the back cover of this issue and help us fuel the fire of healthy discussion. And on your way to the back cover, be sure to read about the Balkan Tank Battle and Independent Operations that may signal the nature of some of those LIC operations I mentioned earlier.

— J.D. Brewer

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ARMOR

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LETTERS

Turbine Economy Improving

Dear Sir:

The concerns expressed about the turbine by Mr. William J. McCanna in his letter to the editor (May-June 1993), are interesting. I do not challenge his experience in Southwest Asia. I would add, however, that there have been many reports from U.S. Armor commanders and soldiers that relate a very different and positive experience with turbine engines. In any event, I think it

is every pertinent to consider what a "new" tank turbine has to offer before deciding, based on Mr. McCanna's experience, that a turbine is not the tank engine of the future. For example, I suspect Mr. McCanna may not be aware that the new turbine, the LV100, has very good fuel economy. The best brake specific fuel consumption (BSFC) of the LV100 is 0.35 lbs per brake hp hr. Good diesels today range from 0.30 to 0.32 lbs per brake hp hr best BSFC. Compared to the AGT 1500 turbine in the M1, the LV100 requires half the air for

combustion to produce 1500 hp. What this means for size of air cleaners required is obvious. Also, it is worth mentioning that the turbine requires no radiators for cooling the engine. By comparison, over 200 hp is devoted to cooling the engine in the case of the diesel-powered Leo II tank. The reliability of the turbine was the principal reason our M1A1 tank in the Gulf War achieved readiness rates of 90 to 98 percent. This is unparalleled in history. In the war games in Europe, the M60 tank, powered with very mature diesels, have readi-

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ness rates in the low 80s while the turbine powered M1s have readiness rates in the 90s. It is true also that diesels have been greatly improved in the last decade. Given the improvement in both turbines and diesels, it is not at all clear at this time which will be the best choice for the tank of the future; it would seem too early to rule out either.

DR. PHILIP W. LETT
Former Program Manager
M1 Tank Program
Warren, Mich.

Gas Turbine as the Tank Engine of the Future

Dear Sir:

William J. McCanna Jr. makes several points about the gas turbine engine that require some further discussion.

The major concern would appear to be fuel use. Requirements for range or fuel use are set by the U.S. Army for any future armored vehicle. If the gas turbine meets these requirements, then it is certainly a viable candidate. Perhaps Mr. McCanna is unaware that the U.S. Army Tank Automotive Command's Advanced Integrated Propulsion System (AIPS) has developed new gas turbine and diesel power packs, both meeting range requirements in smaller volumes than envelope requirements. The

new gas turbine, the LV100, will use 40 percent less mission fuel than the current generation AGT 1500 and over 50 percent less fuel at idle. Turbine technology does improve!

Mr. McCanna notes that the Leopard 2 has better range with less fuel on board. He should also note that the Leopard 2's diesel engine weighs 1455 kg more than the AGT 1500 in the M1. That's a lot of weight, equivalent to over 1700 liters of fuel. It all depends on what you want to trade off!

Mr. McCanna also mentions as shortcomings failures due to starter and electromechanical fuel system. Starter problems are really not gas turbine problems. The gas turbine has good starting characteristics even to temperatures of -50°F which is a bit troublesome for the diesel. The overall readiness of 90+ percent during DESERT STORM and DESERT SHIELD would indicate that there were not too many problems with M1/M1A1 automotive systems.

As to susceptibility to sand and dust, there is no question that any mechanism operating in the desert is in a tough environment. The Army's propulsion system requirement for 200-hour operation in zero visibility sand without maintenance or major loss of power is a good one. This demands self-cleaning air filters for both diesel and turbine systems. As to the turbines high susceptibility to damage from dust ingestion, a simple test might clarify this issue.

Remove the inlet filters from the AGT 1500 and your choice of diesel; pour 10 pounds of sand into the inlet of the running engines. The turbine will just keep on running, and running, and running!

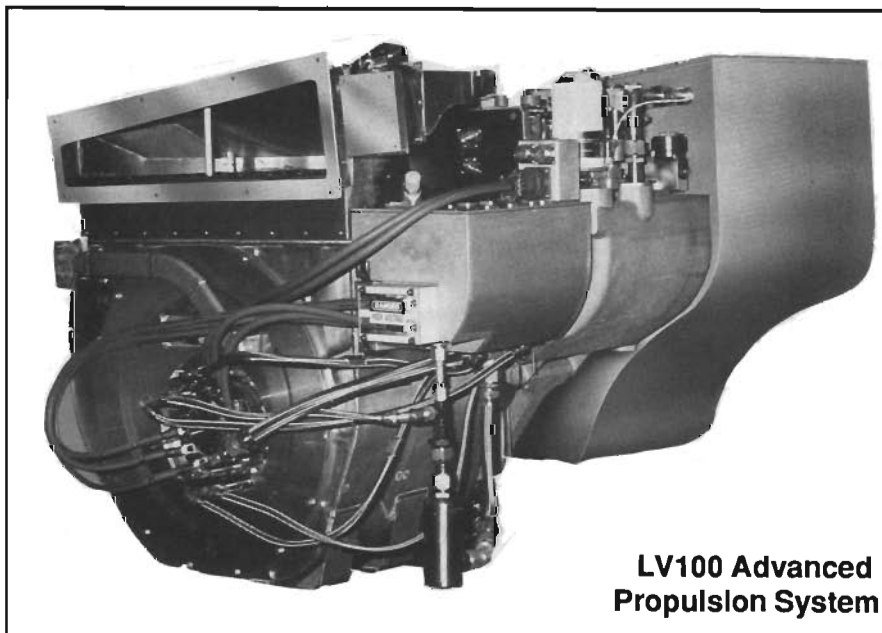
G.K. HOWER
Marblehead, Mass.

The Two-Man Tank — Time for a Reality Check

Dear Sir:

Captain Mike Newell and Robin Fletcher wrote articles in the March-April 1992, and November-December 1992 issues of *ARMOR*, respectively, which both dealt with the two-man tank and its possible future. Both articles supported the idea and heralded it as a great technological breakthrough. Some fundamental assumptions are made, such as the idea that the vehicle is more survivable, and that it actually gives the crew more time to rest. I submit that while the idea may look great to some people on paper, it will not face the reality check of continuous combat, especially in degraded mode. Too many assumptions are made, and technology is over-emphasized. Let us look at this concept in more detail.

Maintenance is a key to any combat system on the modern battlefield. Tanks in particular take a great maintenance effort to keep them running and fighting effectively. Let's face it, if your tank is down your unit's combat power is immediately affected. On the modern battlefield, every fighter counts. Captain Newell has stated that the new two-man tank will be equipped with maintenance prognostic and diagnostic modules that will identify problems before they occur, thus enabling the crew to fix them, or contact the necessary mechanics well in advance of the vehicle breaking down. While this is a great breakthrough and does help the crew and maintenance personnel, it does not cover any type of mechanical fault which may occur. Sensors will not be able to determine if the driver is going to throw track and alert him before it is already much too late. He won't know that he has three end connectors loose on one side and 15 on the other unless he's outside with a socket and ratchet in his hand walking the track. Track maintenance is probably the number one maintenance



LV100 Advanced
Propulsion System

Continued on Page 50

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

The Owner Likes Cavalry Soldiers

In July of 1930, Colonel W.F.H. Godson, commander of the 160th Cavalry Brigade (Reserve), in Detroit, Michigan, gave the following view of unit training:

"We just found out of town an old farm, 100 acres, and an old nine-room house with a poor barn ... [The] owner likes Cavalry soldiers, had a son killed in France and was willing to rent us the place for a nominal [fee] ... Everybody got busy and gave work or money or furniture, pictures, or what have you. We now have a comfortable house furnished, iron flag staff with flag flying, office, three good lounging rooms, kitchen and dining room which is a conference room every Saturday. ... The terrain is ideal for all sorts of minor tactical problems and training. The officers of the Brigade are keen about it and we are having applications for membership from officers of other units around Detroit."

These reservists were clearly proud of their training environment as they readied themselves for the World War awaiting them, but what would they think if they could see the Reserve Component Center of Excellence at Fort Knox today? While individual Army National Guard/U.S. Army Reserve (ARNG/USAR) units continue to find creative ways to train in their home states, the U.S. Army Armor Center is fielding a highly integrated, easily accessible Reserve Component Mounted Warfare Training Center that those 1930's troopers could not have

imagined. Working to make coordination and support for training as effortless as possible for units coming to Fort Knox, the RC Mounted Warfare Training Center will offer units a combat training center-like experience during IDT status. The program will provide a 36-hour "mini National Training Center (NTC)" using upgraded Simulation Networking (SIMNET) technology and assets. By prearranging transportation, billeting, range time, training areas, Conduct of Fire Trainers (COFT), Platoon Gunnery Trainers (PGT), tank driver trainers, and maintenance trainers, the Armor Center at Fort Knox seeks to provide what amounts to a roll-on/roll-off, turn-key training experience.

The concept of an RC Virtual Training Program (RCVTP), offered through the Mounted Warfare Simulation Training Center (MWSTC), is performance oriented, progressing from platoon to battalion/task force operations. At any point, the scenarios which ARNG/USAR units confront can be increased in difficulty or subject to free-play additions, such as altering terrain, weather, OPFOR potency, or other factors of METT-T. Units that employ this virtual training program will first view a SIMNET format of successful exercises and actual NTC AARs prior to deploying to Fort Knox. Pilot programs for platoon-level scenarios are expected to be on-line by Nov/Dec 1993. One of its major strengths comes from the

fact that, rather than being an active component training package that is modified and made to fit reserve component forces, the RCVTP is designed for *reserve* units, yet employable by active units as well.

Some of the features of the RCVTP will include the JANUS family of simulators (to be fielded in 1994), as well as some 9.2 million dollars worth of upgrades to SIMNET, including full-time observer/controllers (OCs) who will conduct AARs and coach soldiers in a mirror image of the NTC system. By acquiring 12 additional workstations, each capable of monitoring within the SIMNET environment, the RCVTP will offer a Unit Performance Assessment (UPA) to quantify performance. Also, soldiers will encounter standardized Tactical Tables which are translations of successful NTC exercises in SIMNET format. Plans include platoon tables (tank/Bradley), tank company/team tables, and battalion/task force staff exercises. Through the interactive computer assets, including JANUS, visiting units can conduct tactically and doctrinally current MAPEXs, Fire Coordination Exercises, and STXs for company-grade officers.

Like Colonel Godson, the reservists of today will find a great place to train here at Fort Knox's RC Center of Excellence. And like their 1930's counterparts, today's reservists will discover that "the owner likes Cavalry soldiers."

COUNTERRECONNAISSANCE

Defining the Nature of Security Area Operations

by CPT Blaise Cornell-d'Echert Jr.

One of the most common recurrent themes in the combat arms professional journals is the success or failure of counterreconnaissance based on experience at the various combat training centers. There continues to be a valid concern that many units lack a clear understanding of how to win the counterrecon battle. Much of the finger-pointing is aimed at the task force (TF) scouts. That this problem is an enduring one is evidenced by the conduct of a special focus rotation (87-1) at the National Training Center (NTC) at Fort Irwin in 1987. That rotation produced an excellent study which examined not only scout performance in reconnaissance/counterreconnaissance, but the integration of the TF staff in planning and executing those tasks. That study led to the adoption of the HMMWV scout MTO&E, and a transition to a stealthy scout.

Now, five years later, we continue to observe critical deficiencies in reconnaissance and counterreconnaissance at the TF level. The consensus is that there is a doctrinal void about reconnaissance and security operations, except in cavalry manuals. Further, that units lack the ability to differentiate between reconnaissance, counterreconnaissance, and security tasks, making them unable to focus their efforts. At a lower level, there is still much blame attributed to the scout platoon and its inability to win both the recon and counterrecon battles. Finally, there is a growing awareness that reconnaissance and surveillance planning lacks the level of emphasis it requires as the critical first step in planning operations.

The source of many difficulties in planning and executing counterrecon

is the failure to understand what counterrecon is, and how it fits into the framework of the defense. Foremost is the notion that counterrecon is a mission or an operation in its own right. It is not. Counterrecon is a security task, and understanding that helps integrate counterrecon tasks into the framework of the defense. But before we go into greater detail, it is essential that there be no failure to comprehend key terminology which will figure prominently in the ensuing discussion.

●**Reconnaissance** — the directed effort to collect information about the enemy and the area of operations.

●**Security** — measures taken by a unit to protect itself from all acts that may impair its effectiveness.

●**Surveillance** — systematic observation by visual, aural, electronic, photographic, or other means.

●**Security operations** — operations designed to obtain information about the enemy and provide reaction time, maneuver space, and protection to the main body. (A security mission in a TF would be a screen.)

●**Screening force** — maintains surveillance, provides early warning to the main body, impedes and harasses the enemy with indirect fires, destroys enemy reconnaissance elements within its capabilities.

●**Counterreconnaissance** — the denial of enemy reconnaissance efforts. The directed effort to prevent visual observation or detection about our activities by enemy reconnaissance elements.

Counterrecon or Security Force?

I contend that there is no doctrinal void, but there is a poor appreciation for developing the security area as an

essential piece of the battlefield. There is poor integration of reconnaissance and security tasks between the 17- and 71-series, and the presentation of security and counterrecon tasks could be better in the 71- manuals. However, the doctrine is there, and if applied would solve many problems for the task force.

What does FM 71-2 say about security forces? It tells us that the security force assists the passage of any covering force, gains and maintains contact with the enemy, locates and destroys enemy recon elements, and closes gaps in forward obstacles. Security forces serve as part of the TF commander's surveillance, counterrecon, and deception effort. Where the difficulty occurs is in the recommendation and selection of the security force. FM 71-2 is not prescriptive on this issue, except for the comment that scouts are the primary counterreconnaissance asset of the task force. Earlier (in Chapter 3), the notion that the scouts are normally the TF security force is implanted. However, if you read the sequence of defense, defense of a sector, and the counterrecon subheadings in Chapter 4, there is very little question about the importance of developing the security area, and designating the elements that constitute a security force.

The first phase of every battle is a battle for information. Reconnaissance is the active measure of acquiring information, so the recon battle is one side fighting to get information while the other attempts to deny it. Hence the term counterreconnaissance. But counterrecon is only one aspect of the security area, and the security mission. Suppose the enemy did not echelon, or layer his recon assets. Does that mean there is no requirement for

a security area? Of course not; the security area is that buffer which allows the defender to hold the attacker at arm's length until conditions are favorable, either in force ratios or information. The forces operating in the security area have a significant role in the sequence of the defense. They allow uncompromised occupation and development of the main battle area. They defeat enemy recon efforts and probing attacks by advance guard formations. They observe and report the approach of the enemy main body, and some elements remain in place to monitor the approach of subsequent echelons. Finally, they serve as the means of ejecting or destroying enemy remnants following a successful defense.

Very few units will assign a security area mission to a company/team, yet it is very clear that this is what is required to accomplish the security area mission. Routinely, the security area is screened only by the scout platoon and, at a certain point in time (12 hours prior to defend NLT time), a counterrecon force is dispatched to occupy positions in the security area.

This is a result of perceiving counterrecon as a separate, rather than an integrated task. Part of this misconception is perhaps derived from FM 17-95 and 17-98, which talks about options for the counterrecon force. However, FM 71-2 clearly suggests using a company/team as the security force.

Some of that clarity may be muddied by references to the scouts being augmented for counterrecon tasks. Still, the concept of using a company/team as a security force is reinforced by the description of tasks for a company/team assigned the reserve mission in FM 71-1.

A company assigned a screen mission will accomplish one or more of the following tasks: deny observation

"Very few units will assign a security area mission to a company/team, yet it is very clear that this is what is required to accomplish the security area mission. Routinely, the security area is screened only by the scout platoon and, at a certain point in time (12 hours prior to defend NLT time), a counterrecon force is dispatched to occupy positions in the security area."

of main defensive positions, destroy enemy reconnaissance, deceive enemy about the location of the MBA, and delay enemy flanking maneuvers.

A company assigned a screen mission must accomplish the following critical tasks: maintain continuous surveillance on all high-speed battalion-size avenues of approach, destroy or repel all recon patrols, locate the forward security element of an advance guard main body and track its movement, while withdrawing, maintain contact with each FSE from each advance guard battalion, report its activity, and make maximum use of artillery and mortars to delay, harass, and destroy the enemy.

If we remember what needs to be done in the security area, it becomes very easy to decide who can do it. That is, after all, the purpose of task organization. Scouts can acquire enemy recon elements, they can maintain surveillance on NAIs, and they can escort covering forces back through or around the TF MBA. A company/team can prevent enemy pursuit of covering forces; a Co/Tm's engineers can close gaps in and construct forward obstacles; a Co/Tm has a C² structure to synchronize the elements in the security area; and a Co/Tm has the logistic support structure to sustain operations in the security area (maintenance, medevac, and resupply). Key points to remember are that scouts are trained and equipped to conduct reconnaissance and surveillance, while infantry/armor teams

have the training and equipment to conduct fire and maneuver to destroy enemy reconnaissance. Security involves reconnaissance, surveillance, and counterrecon tasks. If counterrecon is the preliminary battle fought mainly in the security area, then success will require the integration of all battlefield operating systems (BOS) in planning and executing counterreconnaissance as a function of security.

R&S Plan Supports Counterrecon Efforts

One of the best sources for planning counterreconnaissance is the recently published FM 34-2-1 (19 June 1991). A tactics, techniques, and procedures manual, it spells out, in excellent detail, how R&S planning supports counterreconnaissance. It is not my intention to go into the finer points of developing an R&S plan, but it is important to understand that the R&S plan is the mechanism that focuses the security efforts of the whole TF to counter the enemy's reconnaissance effort. The R&S plan provides the means to position assets to locate, target, and destroy enemy recon assets by integrating IPB and staff planning with a dual focus on both recon and main body approaches.

The typical IPB products generated during the threat integration phase of the IPB cycle are the situation and event template. There is a clear distinction between situation and event templates for recon elements and main body elements. The S2 will generate a situation template based on enemy recon principles. He will consider that the recon will use routes that offer good cover and concealment, may favor nominally "no-go" terrain, will want to establish dismount points and OPs, as well as overwatch positions. While the situation template is normally concerned

with how the enemy will be constrained by terrain, based on the modified combined obstacle overlay (MCOO), those same constraints would now be considered mobility corridors for the enemy reconnaissance.

Based on the recon situation template, the S2 has an idea of where he can expect to find enemy recon elements. Considering line of sight (LOS) limitations, weather and terrain, as well as the enemy's capabilities (thermals, infrared, GSR, etc.), the S2 will try to define enemy recon-specific key terrain. These areas will be labeled as named areas of interest (NAIs) on the event template. He will also want to establish a limit of enemy advance (LOEA), a line beyond which the enemy will be able to detect or acquire elements in the main battle area. Essentially, the LOEA becomes an enemy recon "no penetration" line. It is at this point that the S2 integrates these products in the development of the R&S plan.

The LOEA establishes the rear of the security area, beyond which R&S assets must be focused. NAIs were determined during preparation of the recon event template, and will probably have some overlap with NAIs designated for the main body event template. Based on these NAIs, and to answer the commander's PIR/IR, the S2 will develop specific information requirements (SIR), which are matched with NAIs and specific R&S assets. These will all be enumerated in the R&S tasking matrix. One of the key features will be to consider redundant collection assets, especially after considering LOS limitations.

Staff Integration In R&S Planning

The S2 is not working on the R&S plan in isolation. Why is this so? While the S2 has primary responsibility for the R&S plan, it is but one ele-

ment of security for the task force. Counterreconnaissance is another, and much as the S3 is responsible for the TF OPSEC and deception plans, he is also in charge of counterreconnaissance. The S2 will identify enemy recon high value targets, recommend engagement areas and ambush sites (targeted areas of interest - TAIs), and evaluate the R&S assets' vulnerability to enemy recon elements. The S3 will integrate fire, maneuver, obscurants, and early warning to support the security area. He will task organize the security force to defeat the enemy recon elements well forward. He will plan fire control measures for TAIs, and use targeting data from the S2. He will also develop, execute and monitor the unit's OPSEC and deception plans. The S3 needs to issue the R&S orders to the TF at the same time he issues the warning order for the upcoming mission.

The TF fire support officer and engineer both have key roles in R&S and security area operations planning. The FSO plans and coordinates all indirect fires to destroy or suppress enemy recon. To do that effectively requires that FOs are in place to adjust fires. These FOs become another R&S asset for the S2 to consider for collection tasking. The FSO also provides fire support coordination measures to protect security area forces, especially the surveillance elements (scouts and GSRs). In conjunction with the S2, the FSO will recommend high payoff targets and TAIs. The TF engineer ensures that security forces know the locations of all known obstacles in the security area. He plans additional obstacles, especially those that target the mobility of the enemy reconnaissance elements. Any engineer activity in the security area as part of the TF mobility, countermobility effort must be integrated in the R&S plan as well as the scheme of maneuver for the security force. The TF engineer will also

assist the S2 with terrain analysis and insights to enemy counterobstacle capabilities or reconnaissance.

The XO, as the staff coordinator, ensures that all elements of the staff are working together to develop a product in a timely manner. In conjunction with the S4, he will also develop a logistic sustainment plan for the security force. Key concerns are issues of MSRs into the security area, techniques of resupply, control of movement at night, resupply of pre-stockage of key classes of supply to support the security force's subsequent mission. For the XO, the underlying concern is ensuring that security operations commence as early as possible. This may require hasty planning and hasty occupation of the security area, followed by refinement as the plan is developed and subsequently approved by the commander.

Doctrinal Fundamentals

The fundamentals which must be addressed in the plan for organizing and occupying the security area are listed below:

- specify the security force mission
- provide sufficient assets
- establish security early and well forward
- put security in the right place
- provide adequate command and control
- plan to recover security elements
- plan for subsequent reconnaissance operations
- enforce local security in the main battle area.

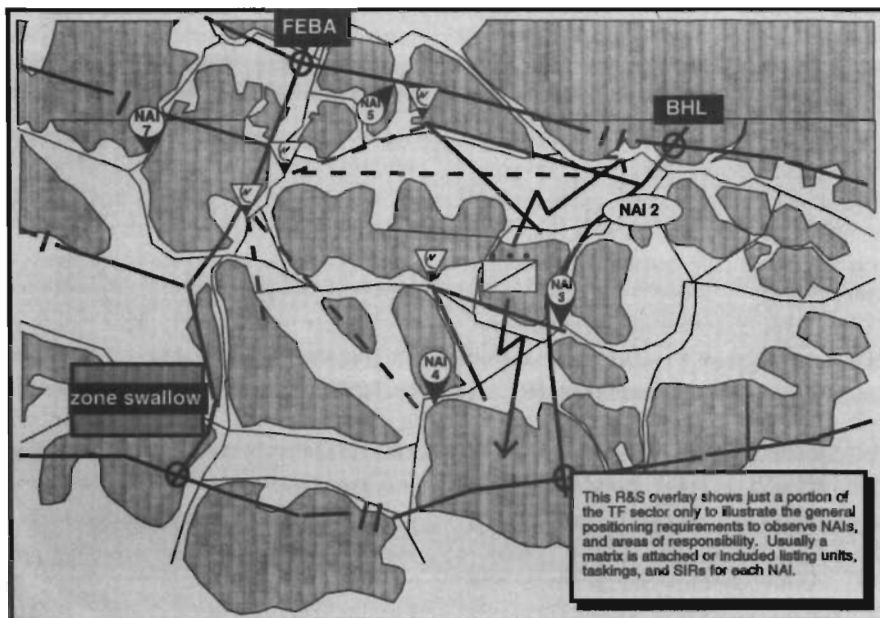
By specifying the security force mission, we identify the means and methods to conduct long range observation of avenues of approach, to neutralize or destroy enemy reconnaissance, and to prevent direct enemy observation of our defensive preparations in the

MBA. Task organization, a result of mission analysis, will ensure sufficient assets are allocated. Doctrinally, a screening force is the minimum requirement to detect and destroy enemy recon elements. Remember that TF scouts cannot screen in the doctrinal sense; they have only defensive weapons and cannot destroy enemy reconnaissance. Assigning a screen mission to a Co/Tm will enable enemy recon to be destroyed, as well as providing greater resistance and deception to the enemy. In addition, the R&S effort is enhanced by focusing the scouts on surveillance.

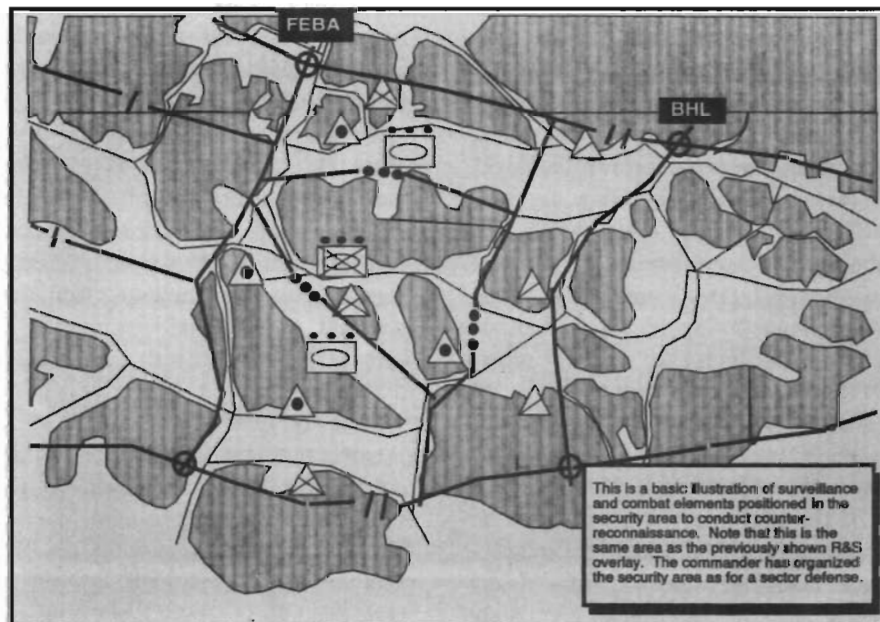
Recon specific IPB and a good R&S plan will facilitate putting security in the right place. This does not necessarily constrain the security force commander; he may adjust elements to suit his scheme of maneuver while still accomplishing specified R&S tasks. However, the TOC must be informed of all changes to unit positioning. Because the TF does not operate by itself, there must be coordination with adjacent security forces, plus there are the R&S requirements imposed by brigade that must be met. The S3 and the security force commander should coordinate contact points, not only in the security area, but also with adjacent security forces.

One of the most critical issues that plagues task forces is the provision of adequate command and control for security forces. The cavalry squadron has the advantage of a TOC in each troop. There is no similar capability at the TF level. Because of the critical nature of security area operations it is essential that C² facilities be adequate to the task. While the security force is performing its mission, the rest of the TF, TOC included, is heavily engaged in preparing the defense. The required degree of attention and focus on the security area won't be uppermost in the commander's and staff's thoughts. For this reason, all elements in the se-

THE R&S OVERLAY



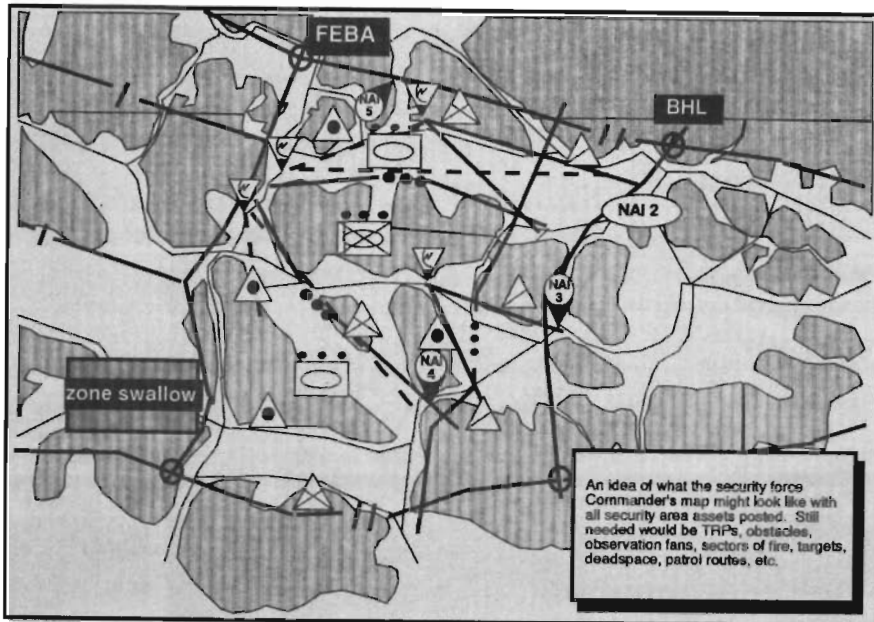
POSITIONING SECURITY FORCES



curity area must be under the command of one leader. There must also, because of the large number of subordinate elements in the security area, be a detailed communication plan to support security area operations. This will require the signal officer to do an equipment survey, determine radio line of sight limitations, establish a

retrans site if needed, and refine a net structure to ensure information flow. Communications must be effective not only within the security area, but must also be able to be monitored in the TOC and, if possible, at each Co/Tm HQ in the MBA.

If, as will probably be the case, the security force is also the designated



reserve, the plan for recovering the security force must be considered during the development of the defensive scheme of maneuver. Further, the TF commander will want to retain as much combat power in his reserve as possible, so the security force commander will need specific engagement, movement, and disengagement instructions. If the security force is to withdraw through or around units in the MBA, those routes must be planned and rehearsed in detail. Planning the recovery of the security force as a rearward passage of lines makes the most sense. There will still be a need for the commander to "see" the battlefield forward of the MBA during the defense, so the security force or some elements may be left in place, may displace laterally, or may hide for a counterattack by fire or maneuver.

The final element of the security plan deals with security in the main battle area. While it has no direct bearing on the operations in the security area, the MBA is considered and units are tasked in the R&S plan. Security considerations in the MBA will have an impact on counterreconnaissance, OPSEC, the deception plan, and a relationship to the scheme of ma-

neuver for the defense. Foremost, anticipate that enemy recon elements will slip through the security area — if not yours, then perhaps an adjacent unit. This is why the S2 considers in his R&S plan dead space or no-go terrain that enters the TF sector on the flanks. The S2 will designate NAIs with attendant SIRs within the TF sector and assign responsibility to units in the MBA. Each unit will also be assigned an area of responsibility for security and local patrols. The S2 focuses those efforts with the R&S plan.

Details of the Security Area

The commander of a unit assigned the security force mission has a great deal of work to do in a limited time. However, the limited time must not force the commander to forego some planning and preparation fundamentals. A problem every task force will have to address in its SOP is how the security force gets briefed and conducts coordination and rehearsals, while still ensuring that the TF is adequately secured.

If the staff has done its job, the security force commander will have plenty of focus for his effort. Acquisi-

tion assets will already be designated (scouts, GSRs, FOs, combat observation/lasing teams (COLTs), ADA EW, etc.) as well as tentative positions, or at least NAIs where they should be looking. This facilitates the commander's division of responsibility within the security area. However, the command relationship with those other elements must be clearly defined. Are the scouts attached, or OPCON? Are mortars attached, or indirect support, etc.? The major task in the commander's planning is how he develops the security area to track and destroy enemy reconnaissance elements. He will probably use the same planning considerations as for a mobile defense in sector. As the counterreconnaissance element, he must develop and communicate a plan which actively hunts or ambushes the enemy recon elements. Only in very rare circumstances will a passive trapping technique be effective. Key to the effectiveness of the "killers" is the manner in which the "finders" vector them in to the enemy recon elements. This is one of the most pressing reasons for security force rehearsals. The security force will need to become very familiar with the terrain where they will be operating. Two tasks can be accomplished at the same time if the platoons conduct reconnaissance (gaining information about the area of operations) by driving or patrolling every route, trail, or path in their sector. One is that they garner a better familiarity with the terrain, and two, they may flush out previously unidentified "stay-behind" or remnant forces from their surveillance positions. Equally important is for the commander to establish maneuver control measures to facilitate the vectoring of killers. While common graphics will help, better would be some method of thermal or passive markers (similar to direct fire TRPs) which can be seen by both the finders and killers.

Another device the security force commander can use is an amplified sector sketch. After all elements have established themselves overwatching NAIs, TAIs, or EAs, they prepare detailed observation (range) cards. In this case, we are more concerned with what can be seen and not seen. Accuracy of limits of observation, line of sight, and visual dead space become very important. Depth is more important than an unbroken line of overlapping sectors of observation. Once a target has been acquired, it must be tracked and handed off from asset to asset until the killers announce "target destroyed." The commander prepares a detailed sketch of the security area showing the overlap, limits, and gaps. Gaps in acquisition coverage are evaluated for patrols, or accepted as allowable risks. This detailed plan is shared with the S2, who will further refine the R&S plan. This plan/overlay also serves as the control graphics for the TOC to monitor operations in the security area.

If the signal officer did not get involved in producing a commo plan, it is critical that the security force commander do so. The planning responsibility for communication is from higher to lower, so the commander must ensure all the elements in the security area can communicate, and know to whom they should talk. The communication plan is not complete just by assigning particular nets; it must be detailed and refined as the security area develops. Scout section A at OP 1 knows that GSR 2 and FO team 1 are looking along the same mobility corridor, and all three know that B section of 2d platoon are the killers for that corridor. All know each other's call signs and have rehearsed tracking and handing off a target (the XO's vehicle).

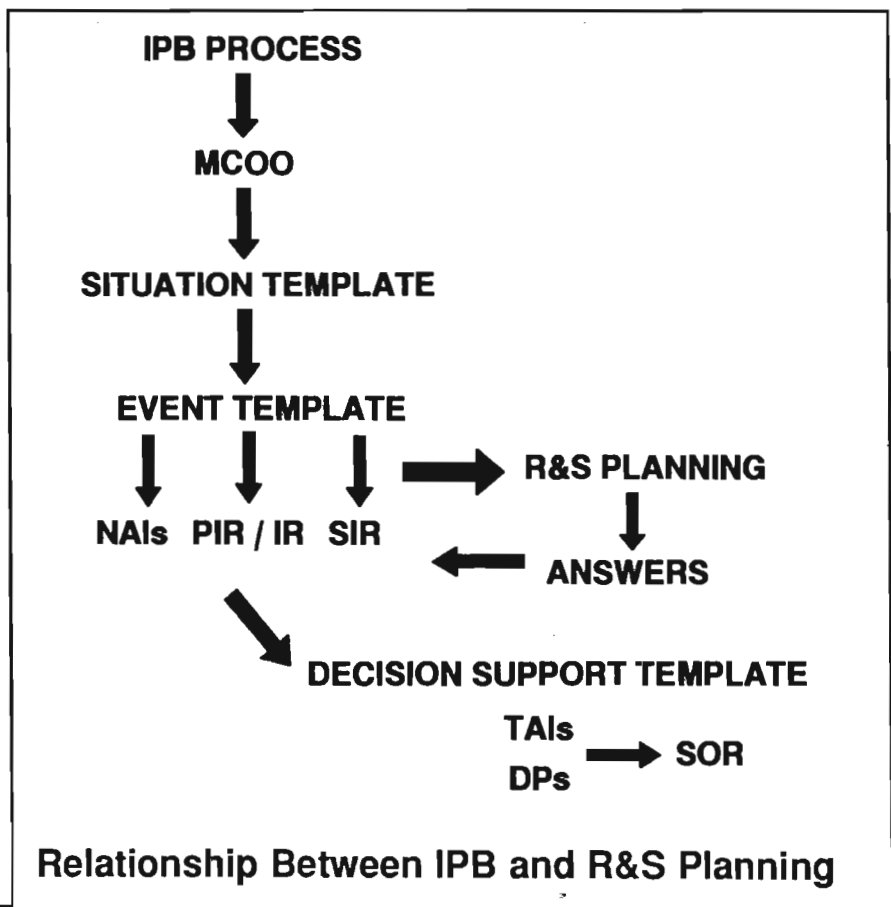
As you can see, the security force commander organizes the security area much as he would a sector de-

fense, only with a greater number of acquisition assets. It is important that he not lose focus on the specified tasks of the R&S plan and his reporting requirements. Because of the number of assets for which he is responsible, and the attendant reporting requirements, he should organize his HQ element into a functional mini-TOC. Maximum use must be made of all personnel, drivers, RTOs, commo NCO, chemical NCO, etc. They should, however, have received adequate training in C² tasks beforehand. There will still be some strain on the Co/Tm's logistic functions as both the XO and 1SG will likely be deeply involved in supporting a larger organization as well as assisting in command and control functions.

Once the security force is in place and preparations in the MBA are well underway, it is not slack time for the

TF staff. There is still a responsibility to monitor operations in the security area, refine the R&S plan, facilitate the C² process for the security force commander, request additional assets from brigade, alert MBA elements of developments in the security area, re-task assets, coordinate with adjacent security forces, coordinate indirect fires, etc., etc.

A number of key activities takes place in the MBA as well, especially during limited visibility. Patrols are directed and coordinated by the S2, obstacles are secured by direct fires and observation, local security measures (patrols, thermal watch, synchronized engine start/stops, etc.) are enforced. Vehicle movement "freeze" times are designated. Direct fire weapon control status should be tight. Reports, even negative sitreps, must arrive on time. Elements in the MBA



must be kept informed of the counterrecon effort in the security area, and they must be prepared to ambush any "leakers" that have gotten through.

The break of dawn is not the time to pull the security force out of the security area to occupy their reserve position. The need for a security force still exists even if BDA suggests that all of the enemy recon assets have been destroyed. Because the OPFOR depends heavily on reconnaissance, if his recon did not penetrate the security area, he will probably reorganize and assault in an advance guard or forward detachment formation. If the security force is still in place they will be able to reduce the effectiveness of the attacking echelon's reconnaissance, as well as track and delay the main body approach. Disengagement and the requirement to not become decisively engaged will be tough to control, but the benefits far outweigh the alternative of not having a security force in the security area as the main body approaches. Vacating the security area is event — not time — driven.

Focused Training

Given the relative importance of the security area to the outcome of a defensive battle, training for security tasks should have a fairly high priority in both the TF and Co/Tm METL. For the Co/Tm, there are two distinctly security-oriented tasks in the ARTEP 71-1-MTP. However, the guard mission is not a relevant security area task for counterreconnaissance. The screen mission (17-2-0312) is, but has its limitations. The underlying assumption in the task performance measures is that the Co/Tm is the only element in the security area, and that the screen mission is a stationary line of OPs, backed by tank platoons. What we need to accomplish

in training for security area operations is the full integration of all BOSs, the staff work and the interaction of multiple units responding to the designated commander. Obviously, each subelement has incremental training tasks it can accomplish to prepare for security area tasks, but until all the pieces are brought together, there will be no synergistic effect.

To what extent can simulations assist in the training process? SIMNET probably has the greatest viability because it allows the crews to maneuver and respond to vectoring instructions. The lack of simulated limited visibility conditions is not a problem. The OPFOR controller must have specific instructions and replicate the methods which will be used by OPFOR reconnaissance elements. Multiple training scenarios should be developed to focus on fundamentals: layering or redundant positioning of assets to exercise target acquisition, another to exercise movement control as platoons conduct zone reconnaissance, another to practice vectoring, etc. Simulations such as the Battle Focused Trainer (a.k.a. JANUS) are not as effective, but could be used in the early cognitive skills stage of training.

Changing Doctrine

In the 1970s, our doctrine underwent significant revision, and one of the methods contrived to inculcate that change was the publication of "How to Fight" manuals. As a result of experiences at the NTC, and a belief that the HTF manuals restricted options and constrained initiative, another major shift in our doctrinal publications followed. In conjunction, the schoolhouse made a commitment to teach officers how to think. It is, therefore, somewhat surprising that there is a trend to revise our tactical publications with the inclusion of "Tactics, Techniques, and Proce-

dures." Have we accepted that there is a critical deficiency in our baseline publications, or that our officers can't think?

As stated earlier, there is no failure in our tactical doctrine to address counterreconnaissance as an element of security area operations. The results of CTC rotations are skewed because of the OPFOR's excellence. Rewriting doctrine is not the answer, nor is creating a TTP which will connote 'do these things and you will win.' The answer to poor performance lies in carefully structured training programs that are clearly mission/task oriented. It starts with the TF commander training his staff and commanders how to think, and how he thinks. Commanders and leaders at all levels must stop assuming that the schoolhouse will produce highly trained, well rounded soldiers and leaders. Training that will lead to success in combat or the CTC only begins at the unit level. Too many of our leaders are using what they think they know about doctrine, rather than studying it and training it. All of the preceding article was derived from existing publications, and is easily accessible to a TF leadership and staff. So, for your next rotation at the NTC or CMTC, do something different. Study doctrine and apply it!

Captain Blaise Cornell-d'Echert Jr. is an Infantry officer currently serving as a scout observer/controller at CMTC, Hohenfels. His previous assignments over 15 years of service range from TOW gunner to company XO in the 82d Airborne Division, to company command and S3 in mechanized units in Europe.

Under-Armor Auxiliary Power Unit (APU) For the M1A2

by Lieutenant Colonel Peter Borosky

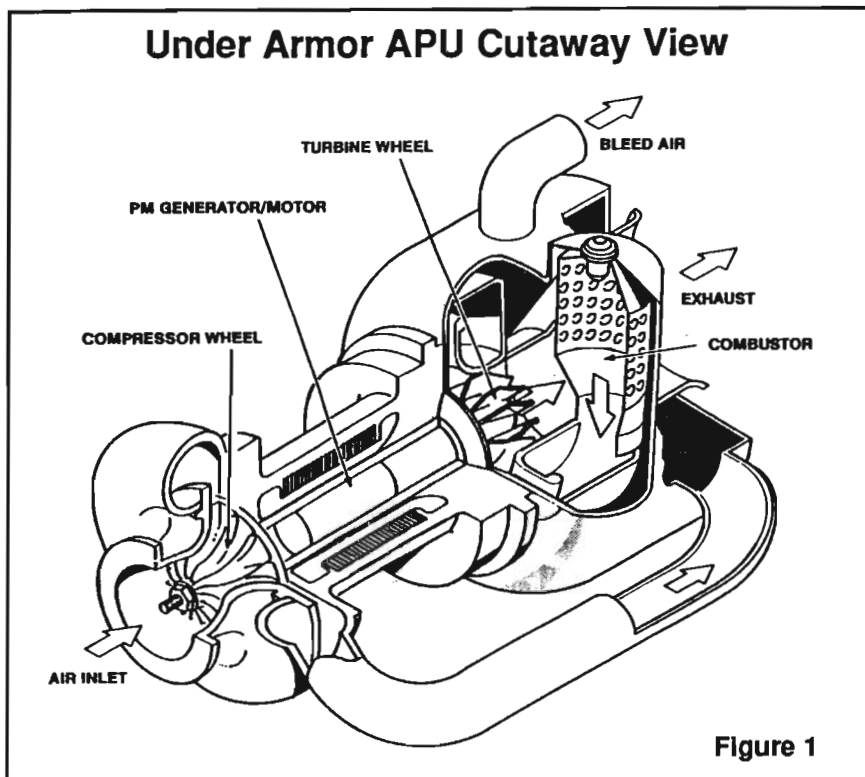


Figure 1

In recent months, interest in an auxiliary power unit (APU) for the M1A2 has gathered momentum. An APU provides tank auxiliary power and true battlefield silent watch capability while reducing costs through decreased fuel consumption, less frequent engine overhauls, and increased electrical component life.

The dilemma is to provide silent watch and not be dependent upon lead-acid batteries (L/A). The answer is an auxiliary power unit.

The silent watch requirement is at least one hour. Silent watch requirements for the M1-series tank are sights operational (CITV-M1A2), radios on listening silence, heater on (if required), turret and gun tube traversing and elevating as required, and NBC system on. Except for NBC capability, this requirement on the M1A2 is limited to the capacity or power available in the six lead-acid batteries.

Fully charged batteries on a M1A2 will provide approximately 20 minutes of silent watch before the batteries lose their ability to start the AGT 1500 engine (12.5 amp hours). The Under-Armor Auxiliary Power Unit

(UAAPU) is a virtual requirement for the M1A2 based on the power requirements of its software-based architecture. This silent watch capability does not include NBC operation, which requires bleed air. Bleed air is also necessary to provide cooling to crew vests.

The M1A1, while not as electrically dependent as the M1A2, must be started after 45-60 minutes of silent watch to prevent L/A batteries from discharging to the point where the engine cannot be started.

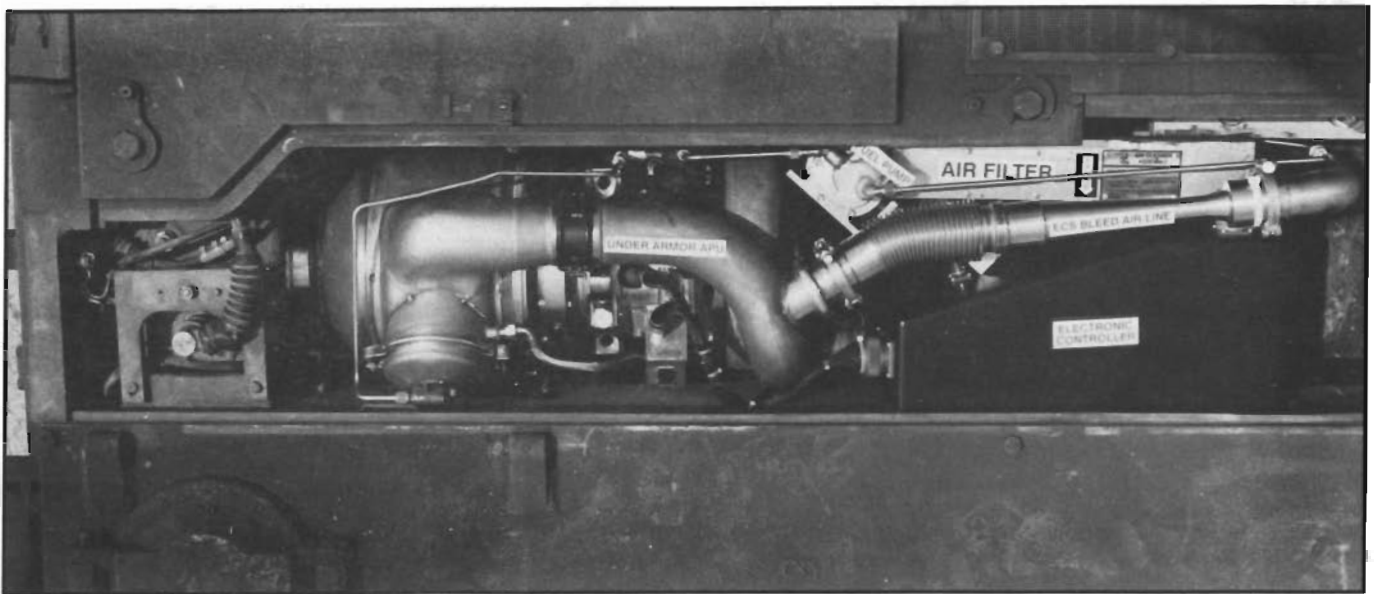
Silent watch, at this point, is dependent upon L/A batteries. Army experience with L/A batteries has not been favorable. It should be noted that the charge available in L/A batteries is primarily dependent upon life of the batteries, their state of charge, and temperature. At 80 degrees F, an L/A battery has 100 percent power available with 100 percent power required to start an engine. At 32 degrees F, a L/A battery has 85 percent power available with 165 percent required. At 0 degrees F, 65 percent power available with 250 percent required.

In addressing the APU, we need to distinguish between two types. One

APU is a standard APU or generator which has conventional components such as starter, gearbox, combustor, and oil lubrication. Normally, these APUs are dependent upon their size for output. Generally, more components require more maintenance.

The Army is currently buying a 2.2kw APU (conventional) for the M1A1. This APU will be mounted in the bustle rack and requires pull start, separate fuel supply, and L/A battery. The Army has bought 1,700 of these units for the M1A1 and USMC. This APU has been under development for a number of years and should double silent watch capability — but cannot run the NBC system or provide increased cooling. The technology is similar to the fender-mounted APU. This article will not address the pros and cons of this system.

The Armor Center, under the command of MG Paul E. Funk, is taking great interest in the turbine APU technology. This APU is produced by a number of companies and contains no gearbox, separate starter, or generator, which equates to far less maintenance for those components which typically cause problems (generator, gearbox).



A turbine APU is smaller, lighter, cleaner, and can provide bleed air to run the NBC system during silent watch (Figure 1).

Additionally, this system provides many advantages:

- True silent watch capability (NBC system).
- 10-20kw output.
- Increased cooling in vests (increase of 9,000 BTU/Hr).
- Under armor capability (Figure 2) in battery box.

Since the APU reduces power requirements for engine start (.7

Amp/Hr), the number of batteries required is reduced (Figure 3). This system would provide tremendous capability and savings. The UAAPU would be fueled by the tank's own fuel system at 50-75 percent less fuel consumption at engine idle, producing major cost savings in engine overhaul and electrical engine components (increases mean time between failures). Cold weather start capability would be greatly increased. In fact, the system could provide full fightability with the engine removed and provide an alternate start capability for the en-

gine. (Turbines can be started with forced air.) Other benefits would be increased battery life and a capability for self-cleaning air filters.

Another capability of this UAAPU system is that it can be coupled with Nickel-Cadmium (NICAD) batteries. New technology in this field has developed sealed NICADs which are advantageous since they provide the following:

- Completely sealed in metal.
- Completely safe — no venting/no hazardous waste.
- No memory.
- No recycling.
- Maintenance free.
- Life expectancy 10-20 years.
- Unaffected by heat/cold.

The Aviation Center has put these sealed NICADs on their helicopter training fleet with great success and cost savings.

Sealed NICAD advantages over L/A are obvious and would be greatly appreciated by tank crews frustrated with L/A battery maintenance and handling. Unfortunately, Vietnam-era experience with NICADs has clouded the materiel developers' desire to evaluate this system.

The up-front costs to this system are high — but when analyzed over 10 years, the costs are significant for the NICAD battery and the APU (Figure 4). Savings over 10 years equate to

Proposed APU Location

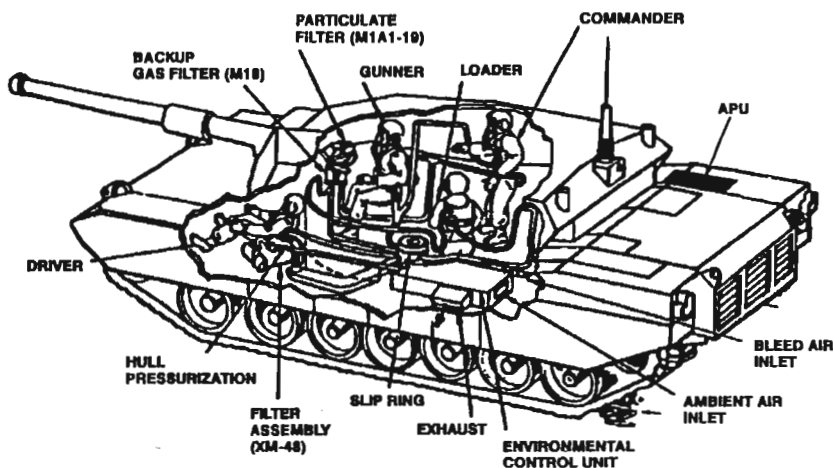


Figure 2

\$6.8 million per tank battalion. These cost savings are conservative and do not include savings on battery maintenance, longer engine component life, hazardous waste (sulfuric acid), etc. This system, APU and/or NICAD, is an initiative which pays for itself.

Will the materiel developers put this system on the M1A2? The Armor Center is firmly behind this system and is preparing to install this system in an M1A1/A2 to demonstrate its worth. Integration seems to be extremely simple and could probably be

installed with a modification work order bypassing expensive integration on the tank production line. This action at Fort Knox will be tested under the Mounted Warfighting Battle Space Lab.

The UAAPU is a necessity for the M1A2 and Block III tank. In summation, the UAAPU:

- Increases mission readiness.
- Increases crew/turret cooling.
- Provides tactical advantages of unlimited silent watch from noise discipline point of view.
- Satisfies the need for greater electrical output: POSNAV, IVIS, CITY, software requirements.
- Increases the fuel savings effect on operations: wasted time/fuel preparing for on-order missions such as counterattacks, limited visibility.
- Is a system that pays for itself.

It is time to get serious and go forward with a truly tactical, fully integrated under-armor APU. Bolt-on, quasi-tactical, low output APUs are not crew friendly. We need to provide a system that will enhance mission capability/readiness and decrease maintenance requirements. The Under-Armor APU is the solution for the future.

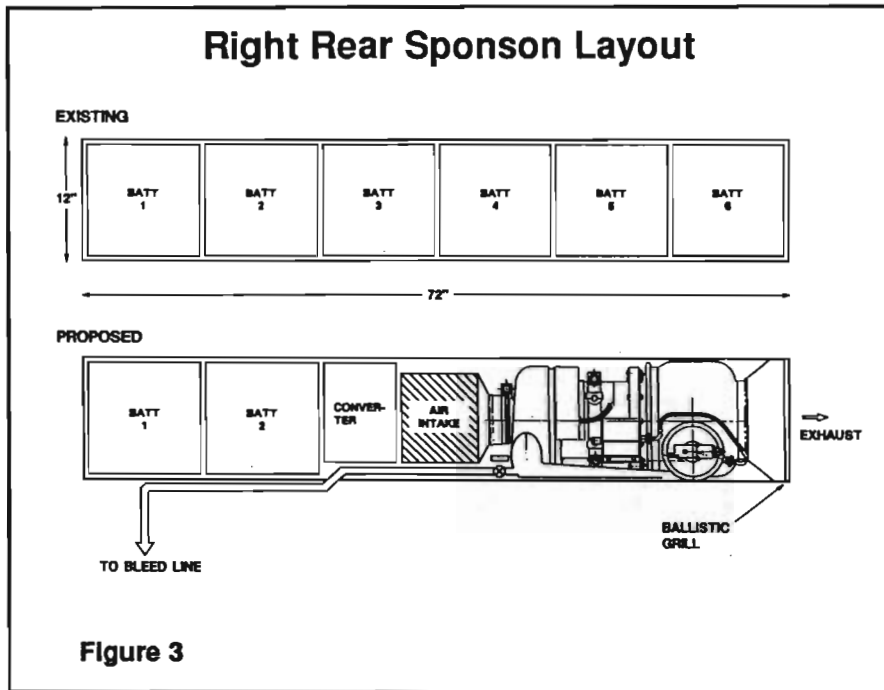


Figure 3

Cost Benefit Analysis

(NICAD)

Initial	Lead Acid	NICAD	Difference
Per Tank	\$330 (6 ea @ \$55)	\$1,900 (2 ea @ \$950)	+\$1,570
Per Tk Bn	\$19,140	\$110,200	+\$91,000
10 Yr Usage*	\$1.15 MIL	\$110,200	-\$1 MIL

*Based on NTC Usage (60 days per lead acid battery).

(APU)

Initial Cost Per Tank - \$50K
 Per Tank Battalion - \$2.9 MIL
 POL Savings Tk Bn (10 Years) - \$.5 MIL
 Maintenance/Engine Savings Tk Bn (10 Years) - \$5.3 MIL

*Does not include life cycle costs.

Figure 4

Lieutenant Colonel Peter H. Borosky was commissioned in Armor in 1973 from Infantry OCS. A graduate of AOB, AOAC, CAS³, and CGSC (resident), he has served in command and staff positions in Germany and CONUS. He recently served as Chief, Combat Services Support Division (4/16 Cavalry Regiment), Fort Knox, Ky. He has a Bachelor of Science Degree in Management from Stonehill College and an MBA from Embry-Riddle University.

Independent Operations

by Ralph Zumbro

Added into the witches brew are millions of left-over weapons in the hands of political splinter groups, warlords, and outright bandits. If, as things are shaping up, we are to be part of the world's 911 system, we'd better get ready for small-scale fractioned operations far from home.

In such places as Bosnia, Somalia, Iraq, Cambodia, and others, we are now seeing that the "New World Order" is going to be very messy. The polarized world of the Cold War is giving way to a boiling pot of national catastrophes, some stirred by climate, some by politics, and most by both. Added into the witches brew are millions of leftover weapons in the hands of political splinter groups, warlords, and outright bandits. If, as things are shaping up, we are to be part of the world's 911 system, we'd better get ready for small-scale fractioned operations far from home. The armored civil action patrols and VC-chasing of the Vietnam era taught the tankers of that time a whole new bag of tank tricks that are in danger of being lost. We learned to do things that are impossible, and this article is an attempt to transmit that hard-won knowledge to a new generation.

My old outfit, A-1/69, was at one time the sole armor support of the 1st Air Cav. It is, I believe, the only tank company in history to get its own Valorous Unit Citation. We were 17 worn, battered M48A3s with double and triple the turn-in mileage on the clocks, spread out over the full AO of an airmobile division. We busted bunkers, escorted convoys, built roads and fords, responded to ambush calls, served as artillery, learned to run in

rice paddies, and probed the green hell for Charlie, sometimes on our own with no infantry close by. When the monsoon hit, we drove those old tanks up the Annam Cordillera to the Central Highlands, back to the Fourth Infantry Division AO, which was even larger.

We literally ran from the South China Sea to, in some cases, inside Cambodia. We escorted trucks from Pleiku to places like Ban Me Thuot and Cheo Rio and Kontum, helped guard Montagnard rice and corn harvests, and moved their villages with our tanks. I have lived in a stone age village with a section of tanks, shared food and danger with the "Yards," hauled their grain on the back deck, and escorted the medic tracks that healed their wounds and infections. We also kicked two battalions of NVA out of Pleiku during TET and utterly destroyed NVA regiment 95B at Mang Yang Pass on April 10, 1968. We did all of this with company resources and detachments from the battalion headquarters company. The primary key to our success was the old TO&E that provided a large company headquarters section.

We had our own VTR, maintenance section, and motor sergeant, and we learned to send mechanics out with the platoons. The old TO had a large supply section, an ammunition NCO

and helper, a mess section that could feed the company-plus, and a few clerks and armorers. This personnel pool gave us a very important capability — company-level crew replacement. I have seen firefights where three TCs got medevacked out in one day. The gunners took over the tanks and cooks and clerks came out with the ammo resupply. We gave in-house cross-training. I got into serious trouble with the Top Soldier one time, for taking his company clerk for a loader.

Morale in that outfit was such that, when a platoon or section went out on patrol, there was always a cluster of cooks and clerks at the gate, hoping for a chance at combat. We even used some Air Force types, and one TC was caught training up the Montagnard/Chinese interpreter as a loader. The lesson here is that, if the present TO is going to be kept official, there are going to have to be semi-permanent detachments from HQ company made to the tank companies, in the line of motor and mess people, and the nearest transportation company has to be tapped for a few five tonners and drivers.

Just when I'd learned how to keep a tank going with controlled cannibalization, ingenuity, and outright theft, the old heap died. The air filters had been leaking, and the bolts that held the sprockets to the final drive hubs



Area Control - One tank on a hilltop can dominate many square miles with pinpoint accuracy. Photo from author's personal collection.

were popping one by one, just for starters. As a result, I drew the Ammo NCO job in company HQ and really learned how the operation ticked. Our company commander at the time, Captain Allen, was one overworked officer. In order to handle our job, we'd had to set up a company-sized fire base out in Indian Country, and like Topsy, it just grew, by accretion, as more capabilities were added. It turns out that, to handle fractioned operations, even the old TO

wasn't quite enough. Here's what we had working out of one tank company base, in order to handle strong point duty, probes and sweeps, convoy escort, and reaction force.

One 17-tank company, with one platoon detached out "near" the Cambodian border, one beating the brush and working MEDCAP (Medical Civil Action Patrol), and one running convoy escort. Of course, this required infantry we didn't have, so two platoons of 4th Infantry Division grunts moved in and set up their own tents...All those husky bodies for sandbag detail.

We developed a need for indirect fire support for such things as illumination fires and harassment and interdiction. The battalion's mortar tubes were shot out, and the APCs had been absorbed by the scout platoon and turned into ACAVs (home made cupolas, out of steel from the wrecking yard). As a result, we got a half-battery of 105s, with part of their battery's FDC. They set up on the west side of the perimeter, and presented me with an impressive ammunition list, and the use of one of their trucks. I eventually wound up with a three-truck flying resupply section, and when I got a new tank, did my own escort duty.

Next, we now needed APCs to move our infantry around, in addition to



Local intelligence network - Just be nice to them and the information will flow in. These were the "border irregulars." Author photo.

having some of them ride, WWII style, on the decks of the tanks. What we got was part of our newly enlarged scout platoon, and a couple of PCs that somebody had put together at the scrap yard in Camp Enari. Then a Military Intelligence detachment moved in. Captain Allen and our XO, Lieutenant Walker, somehow made all this work cohesively, and the composite unit was a success. Looking back, I'd say that operations like that need a TO&E somewhere between the company and the battalion, with a major for CO and a captain for the XO.

What we seem to be facing in the foreseeable future is an unending series of small-scale commitments that don't fit current training, TOs, or issued hardware. We not only have to hold the line in Korea and act as reaction force for what's left of NATO, we've now got to keep a nervous eye on Iran and Iraq, AND put out Third World brushfires, including civic action. The big divisions can watch the big problems, and DESERT STORM proved that they can do the job, but a 120-mm gun Abrams won't cut it in Somalia or points west and south. We are entering another age of LIC, but judging by the political climate, we'd better get ready for LI-LB (Low Intensity-Low Budget).

In fractioned operations, the entire ball game is changed, and the strains

and demands of leadership and crew response get suddenly more intense. Instead of receiving orders and support from on high, you'll find yourself on your own, virtually living off the land. One or two tanks or IFVs might be turned loose in an AO with a few squads of infantry or local militia. Suddenly, you find that you're a combination of U.S. marshal and local medical clinic, and you'll soon attract a fairly loyal group of locals. These must be analyzed, harvested, and put to work as a personal

intelligence sources, as the locals always know where the bandits are. They're your eyes and ears, both into the jungles and into the local communities.

There IS such a thing as a one-tank fire base. One of the first things you can get hit with is strong point duty, using the reach of your gun to dominate ten kilometers of road from a high point. We filled 55 gallon drums with sand, topped them with cyclone fence to stop RPGs, built a monsoon proof bunker, and moved a squad of infantry in for patrol and night security. You do NOT let the locals — who'll be doing your laundry and trying to sell you local produce — stay inside the wire at night, they'll set up their own camp outside. You can't get rid of them, so make sure they're below your line of fire. It's up to you whether you let them keep weapons, but if you catch one with an RPG, he needs an instant debriefing.

We used to say "thank God for helicopters," but in this day and age, the supply bird may be an endangered species. The advent of the SA-7, and commercially available Stinger-clones have changed the battlefield equation. All it takes is one reasonably competent guerrilla leader or warlord with modern equipment, and you're on your own. Now, as never before, a small mechanized unit must have the

1967 RVN Armor Company Headquarters TO&E (from Memory)

Company Commander	Jeep & driver - M48A3 & crew
Executive Officer	Jeep & driver - M48A3 & crew (dozer equipped)
First Sergeant	Jeep & driver - Also civilian driver & vehicle.
Operations Sergeant	M577 commo track, driver, radio operator, and commo technician.
Supply Sergeant	3/4-ton truck & driver, five-ton truck & driver. Supply clerk & assorted indigenous employees.
Ammo/POL NCO	Five-ton truck & driver, fuel tanker & driver. Trailers and supplies detached from bat- talion headquarters. One ammo handler & assorted indigenous employees.
Medics	M113 from HQ Co., with two medics...It had to be armed and fought its way in to the tanks.
Mess Sergeant	Deuce and a half with trailer, converted for mess use. Two cooks, one baker, and the mess driver. Also locally hired KPs and waiters.
Motor Sergeant	One jeep & driver. One five-ton truck & driver. One VTR & two- man crew. One track mechanic, two engine mechanics, a turret mechanic, and a parts clerk. Also, assorted gofers from local population.

While this T.O. was originally intended to handle only three line platoons of five tanks each, with judicious additions and attachments, we handled the equivalent of a small task force. By hiring and training natives, we were actually considered as an employment source by the population. I have seen a HQ unit of this type handle a 250-man infantry company in the old Pentomic Army. If there were some support troops in the line units, up to five platoons and a mortar section would be no serious strain.

independent quality of the old horse patrols. That means spare parts, tools and supplies, and stowage space.

You've GOT to stay mobile, so let's take a look at your running gear. When something breaks or gets blown in LIC, you can't just pull over and let Battalion Maintenance come rescue you. You fix the problem yourself and continue the mission. Maintenance intervals need to be shortened considerably in hot, dusty, high mile-

son boxes, and the skill and expertise to change them... or you're just going to sit and sweat until someone with the knowledge arrives. We had the entire left suspension blown off an M48 named Apostle, and our platoon put that sucker back together in two days and towed it home to Bong Son with no outside help. We had all the parts with us. The crew all survived and came back with a new tank several months later. The remains of the old

age conditions. Depending on the vehicle, you should carry a minimum of two road wheel hubs or bearing sets, with the seals, and consider internal tankage for lubricants. We used to try to carry four road wheels, slung from the bustle rack to act as extra armor. Anything that will set a shaped charge off before it hits your hull is welcome insurance. As all the old pictures show, we carried extra track sections, arranged as extra armor, especially across the front slope. Mine damage is going to be one of your greatest problems if the opposition is at all serious, and it is amazing how much damage American equipment can sustain and still protect the crew. It does however, require spare parts, to include a spare pair of torsion bars lashed to the spon-

tank provided spare parts for about two months.

Since LIC combat is going to require many clearing sweeps, you will live a gypsy-like existence. A platoon or section will set up many temporary camps, usually for a week or two, while the political types are winning the hearts and minds of the locals and finding targets for you, such as the nearest nest of bandits or the fortified home of the local warlord. As a result, an unplanned-for strain will be put on your electrical system, which was designed for straightforward combat, not cruising the back country.

The batteries will be called on to provide lights for bunkers and hooches, radio watch, infrared and passive search, powering searchlights, ventilators and turret power. Night work and the perennial demands of next higher for status reports all take their toll on the batteries, which are also expected to crank the beast on a moment's notice. Our half-solution was to install a knife switch that would isolate the starting batteries from whichever pair was acting as the "service bank."

The ability to generate electricity is critical to the small base camp, especially since the light infantry and the mortar platoon that may be your artillery won't have it either. We sorely felt the absence of the "Little Joe" featured in earlier tanks. Of course, the men who designed the diesel powerpack couldn't have known of the LIC situation, where we spent thousands of hours on overwatch at strong points, as bridge guards, or wired into the phone net at some remote fire base.

The decision to eliminate the auxiliary generator set was based on two factors. The low fuel consumption of an idling diesel, and the known consumption of the gasoline generator in the M48A2. I do not believe the designers had a small diesel set to experiment with, as there are none made in the USA. Having personal experience running a 60-foot cruiser off one,

I can attest to their economy of operation. A 3kw Petter (British), burns 1/4 pound of fuel per developed horsepower, per hour. That's not much, and in today's tanker's world, it could make a lot of difference.

First, it makes extremely long endurance missions more feasible. Second, it eases the problem of thermal signature, because you're only having to diffuse about six horsepower worth of heat while charging batteries. Remember that high tech, including thermal imaging sights, is filtering down to the third world, just like Stingers. Third, its air discharge can be used to heat both the main engine and crew compartment in colder environments. Anyone who's had to get a diesel cranked in Grafenwohr in winter will appreciate that capability. A small genset won't burn as much fuel as the current tank personnel heater.

Extra radios are another priority. There are just too many local nets for a crew to keep track of, and somebody needs to think seriously about getting scanners into a tank's radio suite. When some infantry platoon leader sticks his point man into an ambush, he needs help instantly, not the next time some tanker feels like fiddling with his radio. Almost every tank in old A Company had an auxiliary receiver, because we'd turned controlled cannibalization into an art. Also, by one means or another, most of us had acquired a small portable, such as the PRC-6. These were necessary because, many times, the TC had to go out ahead of the tank to test a stream for trafficability. It helps to be able to reach your crew if there is enemy traffic in the bushes.

You will also be periodically required to send one of your crewmen as liaison or spotter with the infantry, and he'll need his own radio. If the troops in question are American, I guarantee that you won't be able to get a word in edgewise on their frequencies. We used to have to use the feedback shriek to break in. If they are local militia, they may not even

have military radios. In many third world countries, the old CB is used for military communications, good buddy, and a commercial scanner could save lives. Another use for the portable radio is when you're sent out as FO for your own guns. There'll probably be an absence of several things in LIC, including large base camps with dedicated artillery, and when that happens, somebody is going to figure out that a tank's main gun is a creditable artillery piece. Your azimuth indicator is as good as the one found in many SP guns, and by putting the gunner's quadrant on the witness marks, you can do some very accurate long range shooting. That's if you've kept the data cards that came with the ammo.

There will be a mix of vehicles in any LIC operation, and the capabilities of the tank will be used to the fullest. The M1 Abrams is probably the version that will be sent, if not rehabbed M60s, because of the multi-use capability of the 105-mm cannon. As yet, there are only two rounds for the 120-mm gun, severely restricting its utility. You have GOT to have the use of specialized ammunition types when you aren't facing enemy armor. In the whole of Africa,

Modified Task Force Headquarters TO&E (Provisional)

Command and "Staff"

Commander	HMMWV & M2 Bradley
Executive Officer	HMMWV & M2 Bradley
Command SGM	HMMWV & M2 Bradley
Operations Officer	M577 & HMMWV
Communications SGT	M577 & HMMWV

Headquarters staff and clerks form part of the crews of the combat vehicles, giving headquarters a long needed self-defense capability. There is just enough room in a Bradley to make this possible without degrading its combat ability.

S1 is the CSM. S2 is the executive officer with a link to the scouts. S3 is the operations officer. S4 is the supply/ammo officer. An S5 or civil affairs team, somewhat like a Special Forces "A" team, could be spliced in here, and would work independently, reporting to the operations officer.

Supply, ammo, POL and demo are consolidated into a section under a lieutenant, with additional troops as needed. In LIC ops, you can simply hire warm bodies off the economy, and win hearts and minds too.

Mess section is standard TO for a large company, and the executive officer is also the mess officer. A purchasing agent might be added for buying local foods, such as fruit or rice.

Motor section, ordnance, and electronics would all be consolidated under a technical warrant officer. This is going to need either a VTR or an engineer tank, as well as a shop vehicle.

Scouts. There's room for a lot of experimentation. A squad of motorcycle riders with a support vehicle would be a good starting place.

Heavy support. Again, there's room for discussion. A tank section or platoon would work, as would a mortar platoon, or a platoon of three or four 105 howitzers.

Engineers. Probably two squads in M113s, one with a dozer kit, one with a bridge deck. Additional attachments as needed by mission.

Medics. With this many troops, you would need an MD with enough assistants for the line platoons. Possibly they could be detached from next higher. The old Pentomic Army organization used what were called "Battle Groups," to handle up to five of those oversized companies.

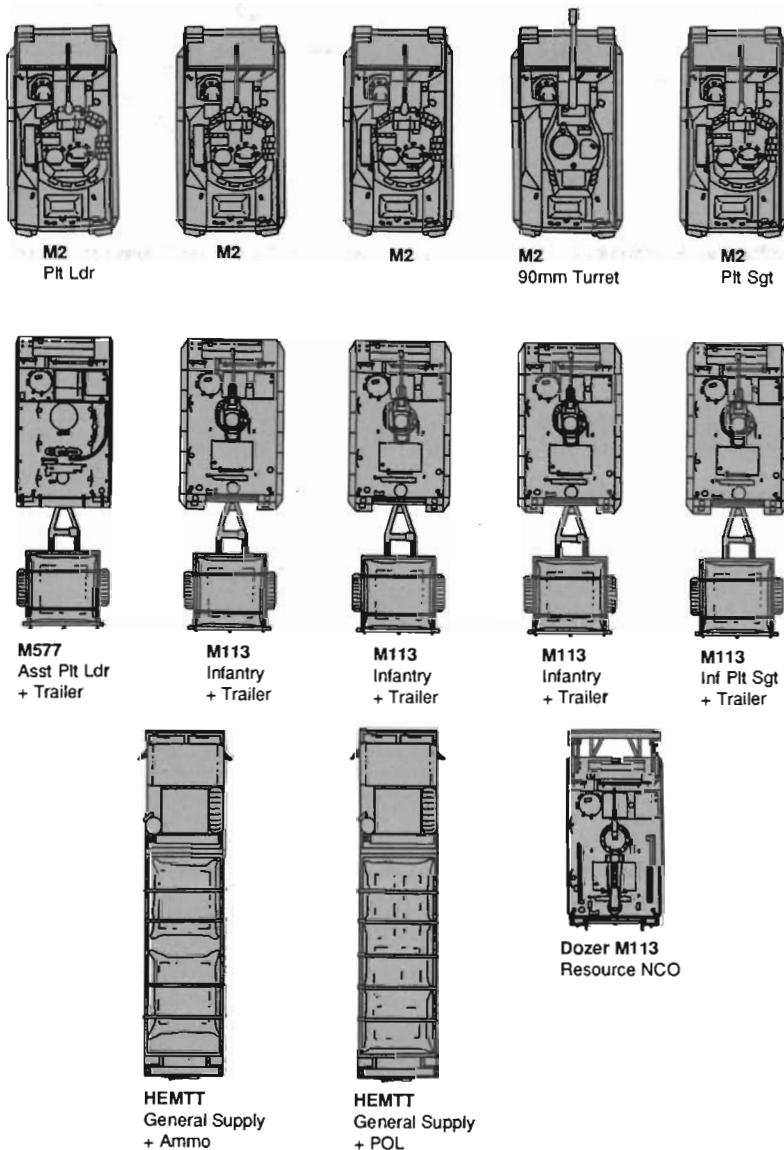
As mentioned, this suggested TO is much bigger than a company, as ours was, but it surely isn't a battalion. It would, however, handle rural pacification and guerrilla/bandit suppression on a long-term basis, until a local government could be trained up, as was done in Korea after the Japanese capitulation. For safety's sake, there is just enough antitank capability to protect against any unforeseen surprises.

there aren't any T80s yet, and we ought to discourage their importation.

With the 105 and its ammunition, the capabilities are endless. As with the 90mm before it, it is a creditable artillery piece. When you get a stable position, range and record all suspicious areas in daylight, and put them on your range card. This allows the interdiction of roads and trails at night. One of the standard administra-

Author's Concept for a Doubled Platoon

Combat vehicles should be M2 Bradley. Infantry tracks should be M113A3 with 30mm cupola. Trailers in TO for vehicles, used to move base camps.



The "Resource NCO" commands the support element and, since his vehicle is the dozer/recovery version of the M113, two attached mechanics will ride with him. He will operate as the base camp NCO and will work with the officer left in charge of the base.

The supply and equipment trailers will only be hooked up to move the platoon base, and then only after a full route recon has been conducted and the route secured. After arrival in the new base site, all trailers will be laagered and the perimeter secured.

The "housekeeping" gear and all defensive weaponry will be divided among the trailers to free up storage space in the combat tracks. An 81-mm mortar section could be stowed in the trailers, for illumination and interdiction work.

tive practices in these Third World brouhahas is to declare a sundown curfew, and you have almost free fire at night. In RVN, many captured VC said that the sudden arrival of a tank shell at a stream crossing or a pass in the hills in the middle of the night had cost them many comrades.

We even registered the parking slots in company base and made range cards for them. That way, any tank in for repairs need only range and traverse to one target on the card to be able to be part of the fire plan. Even a tank with its pack pulled could work the turret manually and keep that quadrant covered. What we really lacked was someone organic to the company with artillery FDC experience. If that lack is repaired by cross training, any platoon on base camp duty can act as the resident artillery battery. The dozer tank can build you a ramp that will get the necessary elevation for long range work.

There are some rounds available for the 105 with which you may not be familiar, as they have not been used in normal training. APERS-M494, for instance, puts out 5000 flechettes at 2700 fps. It can be set for muzzle action or any distance up to 4400 meters. The shell delivers a 30-50 meter footprint. Two shots will effectively erase a platoon of infantry in assault formation. This cannot possibly do the hostile commander's state of mind any good at all.

There is also an antihelicopter round under development. Designated XM945 HE-MP, it uses a light HE shell from the 105 howitzer, mated to a tank gun powder casing and fitted with a Navy Mk 404 fuze. It was designed to pick helicopters out of treelines but, fitted with an impact/delay fuze, it would make a dandy bunker buster. Willie Peter is another underused round. In addition to masking targets or designating them for an air strike, the shell gives a remarkably good approximation of the effects of a flamethrower. It will burn anything combustible, including human flesh.

A combination of APERS, WP, and a good hosing down with the coax will dismantle the average guerrilla ambush in short order. With practice, you learn to spot potential ambush sites and recon by fire. We always considered that anyone lurking in the underbrush by a fording site was up to no good and should be bounced out on general principles.

It is possible to "Armorize," any AO, to quote Colonel Riggs, our battalion commander, by using the tankdozers to smooth out entrances and create quickly usable fords. You do run the risk, however, that the hostiles will spot your work and plant mines and lay ambushes. Now you KNOW where the ambushes will be, and can plot H&I fires and artillery concentrations. You've actually sucked the buggers in. Remember that curfew? Go ahead and shell the hell out of those brand new fords at night, there will be no civilians there, only hostiles trying to plant mines.

This still leaves us with the problem of all those secondary non-tank targets. If the mix of hardware includes enough Bradleys with the bushmaster, the problem is solved by that combination. If the tactical mix is tanks and M113s, we have got a problem. What is frequently lost sight of is that, in the absence of enemy armor, or when that armor is destroyed, the tank must revert to the role of battlefield bully, and that takes a LOT of ammo. Trucks, buildings, light wheeled PACs, troops in coax-proof cover, and so on, aren't worth one of your few cannon rounds, but your MG won't dig 'em out. Again, a Bradley's 25mm will take care of the situation, but it won't handle bunkers or a full scale MBT. The 105 will do the job, but feeding a main gun can be a bear. When we took out regiment 95B, I had to take an ammunition truck in to a platoon that was, at the time, beating up infantry in a woodline, because they were out of everything except canister, and the NVA were too far away for that.



One wrong move...The crew survived this and came out shooting. American tanks are TOUGH!

What's needed is an intermediate weapon like the 25mm or a 30mm for either the TC or the gunner, or both. Some experimenting needs to be done on this. In LIC, the TC is usually too busy spotting for artillery, directing air support, shooting hostiles off the back deck with a pistol, etc., to use his .50 effectively, and there should be a way to get a .50 or an ASP 30 under the gunner's control. With an Abrams, it will take something like a Telfare mount to do the job. If rearmored M60s are used, there is an easier solution.

In RVN, in hundreds of little fire-fights (when working as ammo/POL sergeant, I got feedback from all crews), we never found a need for the gunner's telescope. A number of crews found a way to get a .50 mounted in that hole, and research tells me there is a cradle that will put a Browning there. There's at least two 30-mm guns that are designed as a direct replacement for the venerable fifty. This would give the crew another option for semihard targets.

Mounting a LMG for the loader was a common trick, and some of the crews welded half a ringmount to the turret top. Any crew with a few months on patrol duty will develop some definite opinions as to hardware modifications. I saw loader's guns

with ACAV shields, and my own driver cobbled up a homemade bow gun out of quarter inch plate and a spare M73. We were always looking for more ways to cover the close-in area where our guns wouldn't reach, and many crews welded claymore brackets in various places and ran the wires in to the driver, through the unused bilge pump hole.

Coverage of close-in areas is imperative in LIC, as the problem is not the T80 on the horizon; it's the fanatic in the bushes with an RPG or a satchel charge. One of the first lessons I learned is that the hull and tracks are part of the weapons system, and the driver can take out infantry all by himself. The infantry version of the Bradley, with its close-in firing ports, may be a better vehicle for LIC than anything else we've got in the inventory. There's always some nut willing to board a buttoned-up armored vehicle, and once they're on the back deck, the only cure is for your wingman to "scratch your back," and hope he doesn't riddle the beer cooler. Another auxiliary weapon which quickly became indispensable was the M79 and its variants. Each tank carried one, and when stuck out in the hills alone, we used to fire close-in H&I

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The Black Snake and Pink Panther: Tank Warfare Balkan Style

by Second Lieutenant Peter J. Vlakancic

Pisarovina is the name of a town that no armor or cavalry soldier in the United States Army is likely to recognize. After all, it is only a sleepy little village about 30 kilometers south of Croatia's capital, Zagreb. Yet, there is a good chance that the tank battles that took place at Pisarovina on December 30, 1991, will become much more representative of combat in the post-Cold War era than the widely studied desert battles in Iraq and Kuwait.

Most dismiss the current conflict in Croatia and Bosnia-Herzegovina as an aberration from which few military lessons can be learned. Their primary focus is on the recent victory during Operation DESERT STORM. Unfortunately, it seems as if this overrated success against a weak and undetermined enemy will cloud the eyes of military analysts for the foreseeable future while the war in Croatia and Bosnia-Herzegovina will receive scant attention.

This is especially disheartening because, when one looks at the post-Cold War world, there is very little probability that the United States and its allies will mount another operation on the scale of DESERT STORM again. Much more likely are wars similar to that between Croatia and Serbia (and now the Republic of Bosnia-Herzegovina). One only has to look at current newspapers to confirm this: e.g., Armenia and Azerbaijan, Moldova and the Trans-Dniester Republic, etc. In these wars, opponents have enough armor to make the use of light infantry foolhardy, if not dangerous. But at the same time, such conflicts do not require the heavy forces



that were necessary in Kuwait. These kinds of wars require different solutions, both from those used during DESERT STORM and those planned for the typical light fighter scenarios.

Through this brief description of an engagement that no American soldier has probably ever heard of, I hope to stimulate discussion on the role of armor in these conflicts as well as the capabilities and shortcomings of potential future enemies and allies.

Background of the Conflict

On June 25, 1991, the republics of Croatia and Slovenia declared their independence from Yugoslavia. Unfortunately, the federal government in Belgrade had no intention of letting this happen and ordered the JNA (*Jugoslavenska Narodna Armija* or the Yugoslav People's Army) to quell the secessionist desires of both repub-

lics. The JNA first drove into Slovenia, but soon found its units surrounded and isolated by the heroic Slovenian *Teritorijalna Obrana* (Territorial Defense) and were soon forced to withdraw.

The JNA then pounced upon the Republic of Croatia. Unfortunately for the Croats, there were substantial numbers of ethnic Serbs in various enclaves within the borders of Croatia who, for various reasons, have little desire to remain under an independent Croatian government. The largely Serb-dominated JNA took advantage of this by arming the ethnic Serbs in these enclaves and, with their help, began to battle the poorly equipped militia of the newly formed Republic of Croatia. These areas included the ethnic Serbian enclave named Krajina, centered around the towns of Knin and Glina (Map A), as well as other important cities and towns within

Croatia (i.e. Vukovar, Vinkovci, Dubrovnik, etc.) whose capture would, if not force the Croats to reconsider their bid for independence, at least compel them to become part of a rump Yugoslavia or Greater Serbia.

The JNA, with its irregular ethnic Serb allies, was unable to deliver a crushing blow to the Croats although it is heavily armed with a total of approximately 1,600 tanks, 150,000 men, 450 combat aircraft and helicopters, and over 3,000 towed and self-propelled artillery pieces. This is not to say that the situation was bright for the hapless Croats. During the course of that summer and early fall, nearly one third of the republic had been overrun, and the Serb-run JNA continued to keep the pressure up.

This pressure was relieved somewhat in November with the coming of the fall rains, which turned most of the countryside into a sea of mud and flooded the rivers. This severely hampered the JNA's tracked and wheeled vehicles and forced the Serbs to curtail most of their attacks. However, by the beginning of December and the coming of the winter frost, it seemed as if the JNA and Serb irregulars were determined to launch a series of attacks from the Serb enclave of Krajina, around Glina, towards the Croatian capital of Zagreb (Map B) in order to completely wear down the hard-pressed Croats and gain additional territory before international pressure got too great. As can be seen on Map B, the key to the Croatian defense of Zagreb was the Kupa River, running from Karlovac east to Sisak. Located approximately 40-60 kilometers south of Zagreb, the river constituted the strongest natural obstacle between the city and the Serbs. Past this, the hilly and somewhat wooded terrain was still good defensive terrain, but not as formidable as the river itself. To lose it would be a severe blow to the fledgling nation and would be analogous to the German

loss of the Oder River to the Soviet Army during the defense of Berlin in 1945.

The Croatian Defense

The Croats deployed three ZNG (*Zborne Narodne Gardiste* or National Guard) brigades (the 101st, 102nd, and 103rd) along the length of the river. The organization and composition of the brigades varied somewhat, but, as a rule, they were organized into four infantry battalions, each with approximately 350 men per battalion. Each brigade had at least a battery of artillery. The artillery pieces varied from WWII-era Soviet 76-mm field guns to venerable American 105-mm howitzers donated to Yugoslavia by the United States some years ago. These brigades were basically lightly armed infantry brigades with small numbers of antitank weapons.

Additionally, there were various independent units which backed these three brigades. The Croats controlled a battery of four aging but deadly 203-mm M-115 howitzers that had been donated by the United States to Yugoslavia 40 years earlier. There was a WWII German armored train, running along the Zagreb-Karlovac railway, equipped with 88-mm anti-aircraft guns. In addition to the three ZNG brigades, the Croats could also call on local village militias to keep rear areas safe from possible forays across the river by the Serbs.

There were also several platoons of the HOS (*Hrvatska Oslobodilacka Snaga*, or Croatian Liberation Force) which was the armed wing of an ultra-right political party in Croatia.

The HOS contended that the government was being too lenient on the Serbs and demanded more action against them. They were known for their tenacity and fanaticism in battle at such places as Vukovar, Petrinja, and Eastern Slavonia, but they acted independently due to political differ-

ences with the Tadjman government in Zagreb. As a result, they could not be relied on to follow any orders sent from Zagreb.

Croatian Armor-Mech Assets

The most important reserve the Croats possessed was the 2nd OMB (*Oklopni Mehanizirane Bataljuna* or Armored Mechanized Battalion) which consisted of approximately 600 men, 34 T-55 tanks, one M-84 tank (a Yugoslav copy of the T-72M), four BTR-50P command vehicles, 17 BVP M-80A MICVs, 23 M-60P APCs, five BTR-60s, two M-36 Jackson 90-mm tank destroyers (WWII era U.S.!), two 2S1 122-mm SP howitzers, two ZSU-57 self-propelled anti-aircraft guns, one M-7 Priest 105-mm SP howitzer (also a 50-year-old American dinosaur), plus other assorted soft-skinned vehicles.

The 2nd OMB's varied equipment reflects the types of armored fighting vehicles operated by all sides in the current conflict in Croatia and Bosnia-Herzegovina. Situations abound in which World War II era T-34/85s, equipped with laser rangefinders, fight alongside 50-year-old Shermans. This would probably make many U.S. M1-series tankers chuckle just a little. Despite this, it must be pointed out that many of the older vehicles had been modernized with the addition of laser rangefinders and ballistic computers and should not be taken lightly by any adversary.

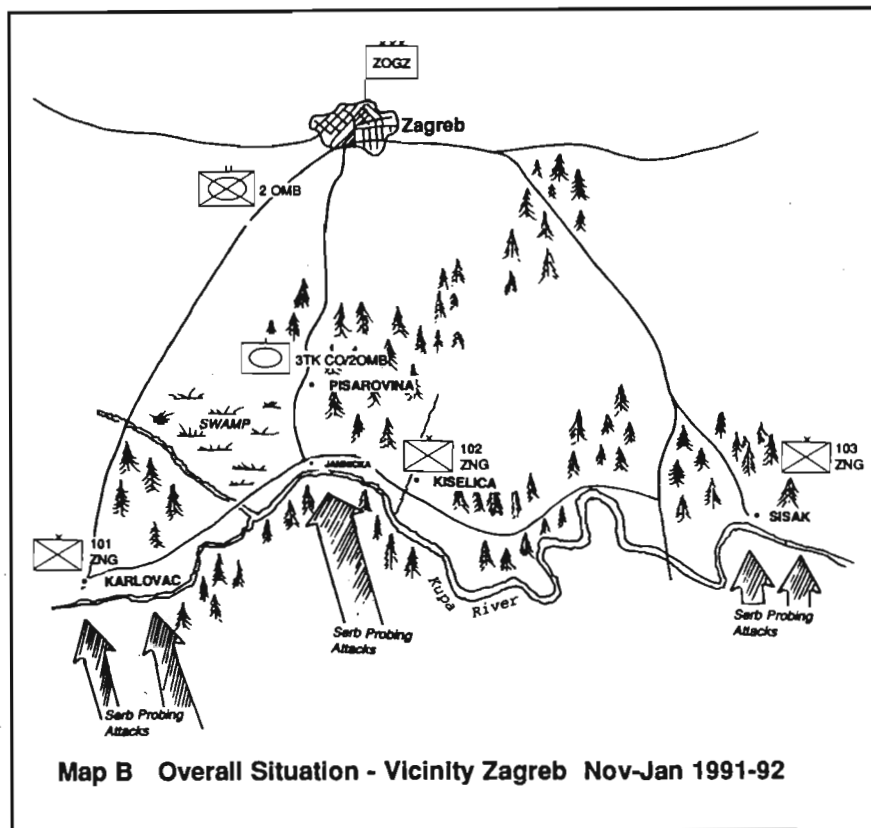
The battalion's organization basically consisted of four armored mechanized companies, one recon platoon, and one SP artillery battery. The 2nd OMB was placed under the direct command of ZOGZ (*Zapovjedništvo Obrana Grada Zagreb* or Headquarters for the Defense of the City of Zagreb) and represented the only Croatian armor unit within the vicinity of the capital.

The Serb Force

Across the Kupa were the JNA and Serb irregular forces, which represented a lot as varied as the Croatian side. (When I refer to the Serb force I include both the JNA and other various irregular Serbian forces.) Within the Serb force were elements of the 5th JNA Army Command, which had been forced to withdraw from its kasernes in Croatia (i.e. the Marshal Tito Kaserne in Zagreb, as well as others in towns such as Jastrebarsko and Varazdin) at the beginning of November. The 5th Army included the 2nd and 10th Mechanized Infantry Divisions, two units that alone accounted for the bulk of the armor on the Serbian side. This consisted of approximately 160 tanks, over half of these modern M-84s, as well as over 200 other armored vehicles such as BTR-60s and BVP M-80A MICVs.

The bulk of the Serbian infantry force, however, was provided by Serbian irregulars, commonly known as *Chetniks* after their WWII predecessors. This proved to be the weak link on the Serbian side. The JNA had to rely on these inexperienced and often drunk *Chetniks* to replace the conscripts from Croatia and Slovenia who previously made up the bulk of JNA infantry units. Though inexperienced, the *Chetniks* possessed huge quantities of small arms, artillery, mortars, and ammunition, something the outgunned Croats did not enjoy. Overall, approximately 5,500 *Chetniks* from the Krajina as well as Serbia proper were available for the attacks on the Kupa by the end of November.

Another great advantage the Serbian side enjoyed was complete air superiority. With one fighter squadron of MIG-21s and two fighter-bomber squadrons composed of Jastreb and Galeb attack aircraft, based in Bihac and Banja Luka in neighboring Bosnia, the Serbs could attack Croatian targets without worrying about



the nonexistent Croatian air force. The Serbs also had about 15 helicopters, most of the MI-8 HIP variety. All this pointed to a very difficult time for the Croats in the upcoming battle.

Attack on the Kupa Line

This was the overall situation facing the Croats along the Kupa River between Sisak and Karlovac by mid-December, 1991. By then, the JNA and Serb irregulars began attacking Croatian positions. It would be quite pointless to describe every action; there were many, and all seemed to share the same characteristics. Rather, it is much more helpful to focus on one such engagement, the fight around Pisarovina. It was one of the few engagements between Croatian and JNA tank forces along the Kupa that winter and is an excellent example of Balkan-style tank warfare.

Pisarovina is a small town located approximately midway between Karlovac and Sisak (Map B). It warranted special attention from ZOGZ because the front lines on the Kupa River were

only four kilometers away, the closest Serbian positions in relation to Zagreb.

The *Chetniks*, with the aid of JNA artillery and airpower, had managed to cross the Kupa at the end of October and held the small village of Jamnicka Kiselica. Then Croatian forces pushed them back across the river a few days later.

The area around Pisarovina was subsequently reinforced with the addition of two companies of the Croatian 102nd ZNG Brigade, as well as the 3rd Tank Company from the 2nd OMB. The 3rd Tank Company was placed in reserve approximately two kilometers southeast of Pisarovina, about three kilometers from the Kupa itself, with the mission of counterattacking any Serb thrusts across the river. The defense focused on the damaged, but still standing, stone bridge across the Kupa. The company's task was an important one as it realized that it could not afford to allow a Serb bridgehead over the Kupa which might be used as a

springboard for future operations toward Zagreb.

The Armor Role

Nobody realized this more than the commander of the 3rd Tank Company, a graying, middle-aged *satnik* (captain) who was identified by his nickname 'Pancirno' (*Pancirno* is the Croatian term for an armor-piercing round). He had been a tank officer in the JNA seven years earlier. Nevertheless, he remained well-versed in military skills during his stint in the reserves and was one of the first volunteers when the Croatian Army was seeking men experienced in tank warfare. Pancirno commanded the motley bunch of men and equipment that formed the 3rd Tank Company. Few U.S. armor officers would envy his situation.

His company was divided into three platoons, plus a headquarters section. The headquarters section included Pancirno plus four other staff members mounted on a BTR-50P command track and two scouts mounted on civilian Lada 4x4 sport/utility vehicles. The first platoon, nicknamed 'Pink Panther,' included two modified T-55As, one with a ballistic computer and Iskara laser rangefinder, and two BVP M-80As, which had Sagger ATGMs mounted on them. The second platoon, nicknamed 'Crne Guje' or 'Black Snake,' was equipped with three T-55As modified with additional armor (one with laser rangefinder), and an M-60P APC. The third platoon (which had no nickname) was equipped with two T-55As, only one modified with a ballistic computer and Iskara laser rangefinder, and two BVP M-80As.

Each platoon also had a squad of eight or nine infantrymen for each of their BVP M-80As or M-60Ps. The vehicles were in fairly good shape, considering that few spare parts were available to the Croats and that the

vehicles had been out in the field in less than pleasant weather for at least a month. However, 100-mm tank main gun ammunition, as well as Sagger missiles, were in extremely short supply, with an average of six armor piercing rounds and two HEAT rounds per tank. The tanks equipped with the laser rangefinders had about twice as many rounds stored on board. There were only three extra Sagger missiles in the entire company for the BVP-80s.

The organization of the 3rd Tank Company reflects the state of Croatian armor doctrine at the time. As one rapidly notices, the 3rd Tank Company was far from being composed solely of tanks, as its name suggests. Even its component platoons were not homogenous in nature, with tanks and MICVs or APCs organized into the same platoon. The organization of the 3rd Tank Company, and most Croatian armored units in general, was a result of two primary factors, the terrain and the general lack of equipment, especially tanks. This forced them to flesh out 'tank' platoons with tank surrogates, such as the BVP M-80A or other AFVs, which at least had the capability of defeating enemy armor.

Tank-Infantry Cooperation

The terrain factor in most of Croatia also dictates that armor be accompanied by infantry in order to prevent its loss to infantry ambushes. The JNA learned this lesson at great cost from their heavy tank losses at Vukovar, as well as earlier fiascos in Slovenia and Croatia. Tanks without infantry support in such terrain are as good as lost. The Croats realized this, and were determined not to lose their valuable tanks to Serbian infantry. This lesson is an especially valid one, one which the U.S. Army needs to take a serious look at if it plans to get

involved in the type of wars the post-Cold War has to offer.

The Lada 4x4 'scout' car was an idea thought up by Pancirno himself, but is representative of the Croatian reliance upon small armored and unarmored wheeled vehicles for patrolling long sectors of the front. Since the Croats were unwilling to waste precious fuel by having tanks, MICVs, or APCs patrol these areas, where their superior firepower and protection would be wasted anyway, they decided that jeep-like vehicles would suffice. They were also much quieter, smaller (which made them easier to hide), faster, and most importantly, cheaper than their armored counterparts. Some of these vehicles were armed with a light machine gun, but in this case, the two scouts in the Lada had to rely on their own AK-47s and pistols for self-defense. The scout vehicle reconnoitered the likely avenues of approach along the Kupa at varying intervals at least five times a day and the scouts sometimes doubled as forward observers for the 203-mm battery, which rarely fired due to a lack of ammunition.

As for manpower, all members of the 3rd Tank Company had prior experience in the JNA, but the levels and types of experience varied greatly. Moreover, an overwhelming percentage of the pre-war JNA officer corps was of Serbian origin, few Croats had experience as officers. This is reflected by the fact that Pancirno was the only prior service officer in the company and the rest of the men had only served in enlisted or noncommissioned officer positions. Also, the men did not all work with the same type of equipment as they did when they were in the JNA. For example, one T-55A was driven by a man who previously drove M-60Ps. The tank's gunner had served on a T-34/85, and its loader formerly served

as a gunner on a M4A3E8 Sherman! This state of affairs was alleviated somewhat by the fact that all men had attended a 12-day refresher course at the hastily created Croatian Tank School at Varazdin, but in some cases this was not enough, as future events will prove. All the men were reservists except for Pancirno and his staff. This meant that they were rotated every two weeks with another group of soldiers. In reality, there were 'two' 3rd Tank Companies, one in the field and the other carrying on normal lives in the civilian world. This measure was necessary in order to prevent the already damaged Croatian economy from completely collapsing, but it did have adverse effects on training, as can be well imagined.

The Croatian Defense

The 3rd Company was deployed approximately three kilometers behind the Kupa on December 20, 1991. The company was still focused on a possible Serb thrust across the bridge at Lasinja, but did not discount a possible river crossing by the Serbs with their snorkel-capable M-84s and T-55s. Infantry elements of the 102nd ZNG Brigade were deployed in a defensive line along the river and had made good use of the lull in the fighting to prepare minefields, wire obstacles, and wooden fortifications. However, due to the limited material and equipment available, the defenses were not too extensive and definitely not impregnable to a determined enemy assault.

The infantry's only antitank assets included several RPGs, about a dozen LAWs smuggled from the United States, and three World War II-era Soviet 76-mm field guns with about 30 rounds apiece. The burden of defense against an enemy attack supported by armor would have to fall upon the 3rd Tank Company, and Pancirno knew this.

The morning of December 21 began ominously for Pancirno and the 3rd Tank Company. That morning, at approximately 0800 hours, the Serbs began an artillery barrage. It was mostly 105-mm fire, but some heavier pieces such as the 122-mm and 152-mm pieces could be discerned. This contrasted with the normal Serbian tactic of using only smaller 82-mm mortars at widely dispersed intervals throughout the day. Most of the fire was directed at the Croatian infantry located along the banks of the Kupa, but some rounds also fell in the vicinity of the 3rd Tank Company.

For the most part, the Serbian artillery was not very accurate, but the volume of fire, estimated at around one round a minute for about an hour and a half, made it foolhardy to walk around in the open. The Croats suffered no military casualties from the barrage, but the Serbs did manage to wound one of the few peasant farmers remaining in the area as well as kill an unwary cat.

The day was also marked with an increase of air activity on the part of the Yugoslav Air Force. Most of the aircraft were MIG-21s, and many of them simply overflew the Croatian positions while flying toward Zagreb, but some of the planes loitered over the Kupa without attacking anything.

Pancirno had ensured that the company's vehicles were well camouflaged in their positions in the nearby woods. The threat of air attack was always present, and the 3rd Tank Company had no organic air defense weapons, save for the 12.7-mm machine guns mounted on the T-55s and the 20-mm cannons of the BVP M-80As. This made movement during the day fairly dangerous, and Pancirno constantly worried about the day the 3rd Tank Company would have to move from its positions in order to counterattack any Serb advance over the Kupa. He designated the BVP M-80As with their 20-mm cannons as

the unit's primary air defense weapons and tasked them with that responsibility in case the 3rd launched a counterattack. Fortunately for the Croats, the Yugoslav pilots were relatively inexperienced in air to ground combat, and the weather was getting increasingly worse. Still, it was something that could not be discounted as later events would prove.

Serb Tanks Move Up

The attack the Croats expected did not materialize that day, but this did not mean that all was calm. Air activity still continued throughout the day as did the inaccurate artillery attacks. But more sobering was an incident that took place at around 1815 that evening. During one of the patrols by the 3rd Tank Company's Lada, the Croats had sighted a grouping of three JNA M-84 tanks about 500 meters from the southern bank of the Kupa. Unfortunately, the Serbs had also spotted the Lada and one M-84 tank fired a 125-mm round at the hapless Lada. After that round had missed them by a couple of meters, the Croats did not bother waiting for a second round and 'displaced' to the 3rd Tank Company's HQ. They were able to mark the position of the three enemy tanks on the map and, with this information, Pancirno attempted to call in 203-mm fire on the enemy position. The commander of the 203-mm battery said that his guns were down to four rounds per gun and could not afford to fire at any targets until the Serbs' main effort was ascertained.

The night passed by uneventfully, to the surprise of Pancirno and the rest of the company. This illusion of tranquility was pierced at 0625 hours with the sound of tank fire in the vicinity of the Kupa. The Croatian infantry reported via radio that the enemy attack had begun, and that they were under heavy tank fire from across the river.



Pancirno, unwilling to commit his unit prematurely, sent out the Lada scouts to determine the real situation. Once the scouts got in the vicinity of northern bank of the Kupa, they were able to confirm that JNA tanks were firing toward the Croatian positions, although they seemed to be targeting the abandoned buildings along the Kupa. The scouts were also able to confirm that the culprits were three M-84 tanks, probably the same ones they had spotted the day before. The enemy tanks were firing from positions near some small houses about 400 meters south of the Kupa. Besides the three tanks, the scouts couldn't see any other enemy activity and reported the situation to Pancirno.

Pancirno decided against committing his unit against this minor provoca-

tion. The Serbs commonly use their tanks as a type of direct-fire artillery piece to compensate for their inaccurate indirect fire, and Pancirno figured that this was simply additional preparation for the main attack. The tanks stopped firing at about 1000 hours, and their fire was replaced with some more inaccurate artillery fire directed towards the Croat infantrymen.

During their subsequent patrols that day, the scouts noticed that the three JNA M-84s remained in the same positions throughout the day and only left them at around 1800 hours. The night of the 22nd-23rd passed by uneventfully except for some small arms fire from the Serb side of the Kupa at around 0100 hours, which quickly died down for some mysterious rea-

son. (The Croats believed it was simply some drunk Serbs having a good time. The Serb irregulars frequently got drunk from their homemade plum brandy and love to fire their weapons while intoxicated). The next morning was again interrupted with tank fire. The scouts confirmed it was coming from the same three tanks at the same position as the day before. This time, their fire was directed solely at the Croatian infantrymen along the northern bank of the Kupa. They were beginning to take some losses. The fire was so intense that the infantry commander requested that Pancirno's tanks do something about it.

It was still not certain that this was the prelude to an attack across the Kupa, but Pancirno also realized that his men needed to score a victory for



morale purposes. He sent the scouts out to determine that the JNA tanks were still at the same location. When the scouts verified that they were, Pancirno sent out one T-55A and one BVP M-80A from the Pink Panther platoon to a position on a small hill approximately 2,800 meters from the JNA tanks.

Pancirno's intent was to destroy one of the M-84s with a Sagger ATGM from the BVP M-80A while the T-55A would provide close cover if any Serbs appeared across the river (which was only 500 meters from the intended firing position). The weather was extremely overcast that day, so there was no threat of air attack, and this was probably a factor in Pancirno's decision to conduct this operation.

By 1400 hours, the vehicles were in place and ready for the order to fire. The JNA tanks were still in the same positions they were in that morning. This gives an indication of the lack of skill of the newer recruits to the JNA, as well as the JNA's relative lack of concern for their tanks when out of range of light antitank weapons. The order was given, and the Sagger was launched from the BVP M-80A. The Serbs did not seem to notice it. They were still busy firing at the infantrymen.

The Sagger hit one of the tanks on its turret, and a small explosion was seen. Almost immediately, the Croatian vehicles displaced to their original positions and could not verify a kill. However, the infantrymen reported that the JNA tanks stopped fir-

ing and two of them withdrew while the one that was hit remained there. During the rest of the battle, that tank would remain there, apparently inoperative, which gives an indication of the Serbs' low repair and recovery capabilities. The Serbs responded with some inaccurate indirect fire, but the Croats were overjoyed at their apparent success and were happy that they were not receiving some fairly accurate tank fire any longer.

The next two days passed uneventfully, contrary to what Pancirno and the rest of the Croats expected. Although a truce had been arranged for December 24 and 25 to celebrate Christmas, the Serbs, being of Eastern Orthodox faith, celebrated Christmas in January and were not expected to

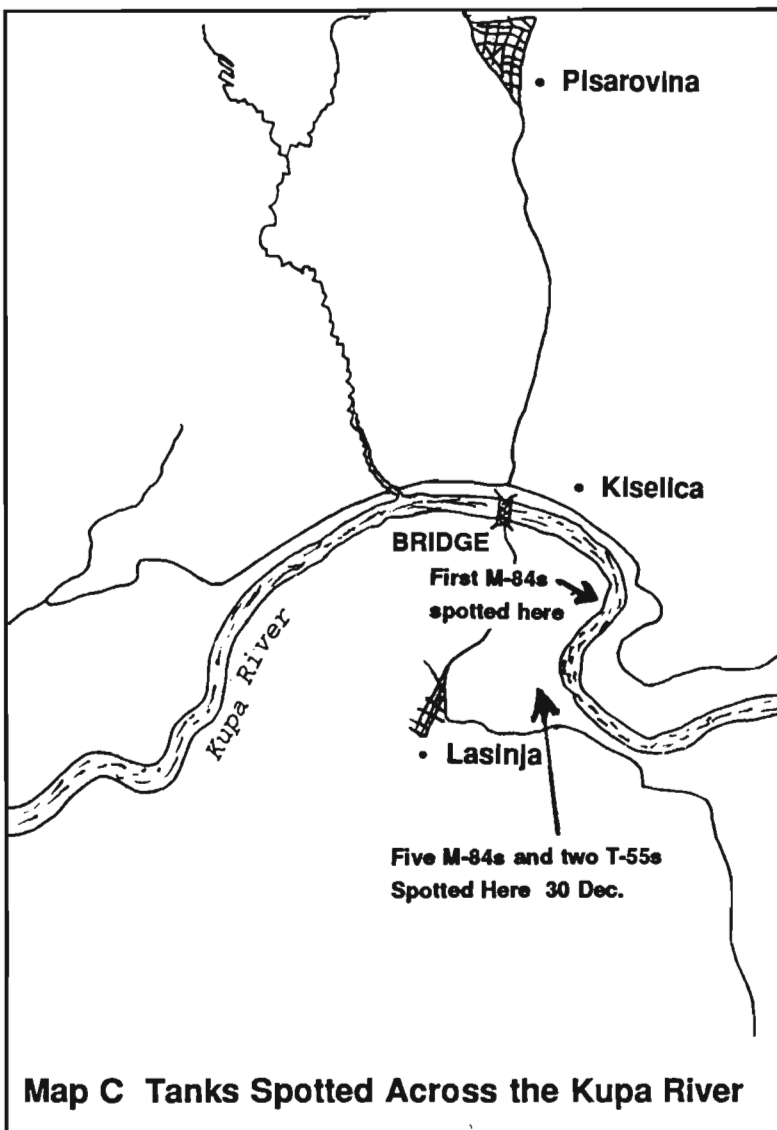
respect the Roman Catholic tradition. Serbian indirect fire continued sporadically throughout those days, but this was probably a reflection of the deterioration of the chain-of-command within the Serbian ranks with renegade artillery commanders defying the cease-fire agreement. Pancirno had a tough time himself in keeping his men from getting too drunk during the Christmas celebrations as this was probably the single greatest holiday in predominately Roman Catholic Croatia and one which has been frowned upon in the former Communist Yugoslavia.

The next four days also went by uneventfully. The scouts noticed that the Serbs stepped up their infantry patrols along the river, and that some bridging equipment was seen in the vicinity of the damaged bridge over the Kupa.

Spilling an Attack

On December 30, at around 0700 hours, the Croats were greeted with the strongest artillery attack yet, and the volume of Serbian small arms fire from across the Kupa also increased significantly. Five M-84s and two T-55s were spotted in the small village of Lasinja on the southern bank of the Kupa (Map C). Pancirno believed that this was the day of the attack. He was determined to break it up and decided to take a risk.

He sent the Black Snake platoon in a hide position approximately 1000 meters (determined by the laser rangefinder on one of the tanks) from the location of the previously destroyed Serb M-84 and told them to await further instructions. Once they were in place, he immediately requested that the 203-mm battery lay down everything they had on the town of Lasinja. The battery commander agreed to it after some arm-twisting by Pancirno (the fact that Pancirno offered him a



carton of Marlboros didn't hurt either).

The results were spectacular. The sound of the 203-mm shells soaring through the sky was easily confused with the sound of a jet plane and as a result the Croats dubbed the 203-mm guns the 'Croatian Air Force.' Their fire was amazingly accurate and seemed to have destroyed one of the T-55s with the rest scattering in various directions.

Two of the M-84 crews moved to join the previously immobilized M-84 in its fighting position and headed toward that direction. Just as they were about to reach it, the scouts alerted the three T-55As of the Black Snake platoon. The platoon immediately came up to a hull-down position and began firing at the M-84s. The M-84s

had their flank armor exposed and suffered accordingly. The first volley achieved two hits and one kill. The second volley achieved two more hits on the remaining tank and apparently killed it. However, one of the Croat T-55As seemed to be in trouble as its round fell way short of the target.

As the rest of the tanks pulled back into their original positions within the company, the single T-55 only pulled back enough to get into a hide position, with the commander and gunner jumping out of the tank running toward Pancirno after it stopped. When Pancirno and the scouts reached the stationary tank and peered into the turret, they understood why. The loader had his hand caught between the breech and a metal plate no more than a centimeter apart. The breech

had apparently hit his head; his skull was fractured and brain matter was visible. Despite this, he was still alive, and would remain so throughout the two hours it took for the ambulance to come to the rescue. By that time, the Serbs were attacking the position with mortar fire. While waiting for the ambulance, the tank was driven into the woods to hide it from enemy aircraft. Yet, not five minutes after the clearly marked ambulance arrived, an enemy aircraft began attacking it and the tank. The pilot was a bad shot, missing by 200 meters and eventually disappearing after two passes. In the meantime, the loader had his hand amputated (without any anesthetics, which were sorely lacking) and evacuated to Zagreb for treatment. This incident reflects the poor state of first aid in the Croatian Army, as well as the poor equipment they have to work with. It was later discovered that the loader had a broken earphone in his tank's helmet. He could not properly communicate with the gunner, who had fired just as the loader slammed a 100-mm round into the breech. The loader was still in the main gun's path of recoil.

This incident soured an otherwise successful day for the Croats. The Serbs seemed to have been shocked by Pancirno's attack and did not effectively respond with any type of fire for the remainder of the day. The scouts did not notice any significant Serbian activity across the Kupa for the remainder of the day. The Croats believed a total of three Serbian M-84s and one T-55 were destroyed by that day's action by the 3rd Tank Company. Pancirno was pleased when he heard the news from the scouts later that day and promptly ordered enough lamb and wine for the entire company for the coming New Year's victory celebrations.

This engagement seemed to effectively end the Serbian attempt to get across the Kupa in this sector. The Croats' effective resistance, coupled

with the fact that several European nations, led by Germany, were in the process of recognizing the beleaguered nation of Croatia, seemed to convince the Serbs that any thrusts towards Zagreb were useless, and that time would be better utilized by consolidating their gains. By January 15, a European Community-sponsored ceasefire went into effect throughout Croatia and effectively froze the positions of the two sides.

Conclusions

This account of a battle no American would probably ever hear about gives a good example of the type of armor battles and engagements fought in the current Balkan conflict. Hopefully, one can also discern the different lessons that can be learned from such a battle. Among these are the capabilities of the two sides in terms of equipment, manpower, tactics, and leadership. Hopefully, this article will open some eyes to the role of tanks in this type of conflict, a style of warfare that rages in many parts of the world today, most noticeably in the Balkans. Pisarovina will probably never rank on the same level as the battle at 73 Easting in terms of U.S. Army interest. This is unfortunate, considering that there will be a lot more Pisarovinas before there is ever another 73 Easting.

Author's Note on Sources

This paper is written almost entirely from conversations with Brigadir (Brigadier) Bozo Purgaric of the Croatian Army while visiting Croatia in the summer of 1992. My cousin, who is also a member of the Croatian Army, thought that I would be interested in speaking with him. Brigadir Purgaric was more than willing to give me all the information I asked for, as well as directing me to members of ZOGZ who gave me additional information concerning Serbian dis-

positions. Brigadir Purgaric was a former brigade commander of a JNA tank brigade in his 30+ years of service and, as a result, was invaluable for his insights into the tactics used by the JNA tank force. Without his help, this analysis would have never been written.

Obviously, there are no other accounts of this battle, but other sources used to verify some facts on the overall situation were:

Arbuckle, Tammy, "Yugoslavia: Strategy and Tactics of Ethnic Warfare," *International Defence Review*, Vol. 25 1.92, pp. 19-22.

Lackovic, Tomislav, "Tigrovi Oklopljenih Kandzi," *Hrvatski Vojnik*, 2/14, 1992, pp. 16-17.

Nativi, Andrea, "The Yugoslavian Tragedy," *Military Technology*, 12/91, pp. 92-98.

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German Antiguerrilla Operations in the Balkans, 1941-44

Reviewed by Second Lieutenant Andrew D. Goldin, USAR

German Antiguerrilla Operations in the Balkans, 1941-44 is a historical study published by the Army Center of Military History in the years immediately after World War Two. Many of the book's facts are based on interviews of high ranking figures who played key roles in the occupation of Yugoslavia and Greece. In addition, the study makes extensive use of unit histories and other official accounts. The purpose of the study is not to give an exhaustive account of the German occupation; rather, it is to describe the military aspects of the guerrilla movement and the German operations against them. Allied actions and political considerations are included only to the extent that they affected Axis activities. For the same reasons, actions of German allied armies (Italian, Bulgarian, and puppet government) are only briefly covered.

What makes the book a valuable and timely addition to anyone's library today is the study's description of the rise and development of the assorted guerrilla movements, the German reaction to them, and most importantly, the lessons learned from the German occupation experience.

According to the author, Yugoslav and Greek forces were "stunned, rather than crushed, by their sudden defeat" at the hands of the modern and mechanized Germans. After the armistice in May 1941, prisoners were quickly paroled and various puppet states were established in the German and Italian areas of occupation. While "... the German authorities were cognizant of the threat (presented by) these unemployed ex-soldiers and other dissident elements, little was done to forestall the obvious threat of revolt." Mismanaged occupation and brutal repression of the population fanned the smoldering resentment against the Axis forces, and as a result acts of sabotage and convoy ambushes became commonplace throughout greater Yugoslavia by the end of 1942.

To their credit, the Germans and Italians did establish various client states in their respective zones. This proved useful both politically and militarily, as granting a token amount of self-determination helped establish a veneer of legitimacy to the German occupation. Furthermore, the establishment of these vassal states facilitated the handoff of daily policing duties from the over-stretched German Army to the local authorities, thereby reducing the German's occupation burden. While the technique of "divide and conquer" was a useful political tool, and eased Axis administrative and policing duties, the military units formed by these national states proved to be of little use in combating insurgents. Consequently, much of the actual fighting fell to the regular *Wehrmacht* (German Army) troops, who were desperately needed elsewhere.

Significantly, both the Germans and the Allies considered the Balkans in general, and Yugoslavia in particular, a secondary front. Accordingly, neither side was willing to make a serious commitment of forces there. Although Yugoslavia had a key location and valuable natural resources, the Germans did not and could not commit more than the minimum number of troops necessary to keep order. As a result, "suppression of the resistance movement remained a makeshift affair."

Meanwhile, the organizations and equipment of the insurgents varied widely. The groups were divided along ethnic, religious, and political lines. Chetniks (royalists) preferred to conduct primarily small scale operations of sabotage in order to limit likely Axis retaliation in their fixed base areas, i.e.,

local cities and villages. Meanwhile, the Partisans (Communists) operated in battalion and larger sized mobile maneuver groups not limited to specific regions. With little or no "base area" to protect, the Partisans were more willing to attack German and Italian units directly and incur the possibility of greater retaliation against the local civilian population.

By mid 1943, the political and military picture became muddled. In addition to the existence of Serbian, Croatian, and Bosnian (Muslim) Axis client states, the presence of German and Italian troops, and the activities of the predominantly Serb Partisans and Croatian Chetniks, there were also guerrilla groups who acted with no authority other than their own. Conflicting nationalistic, political, and religious ideals soon brought on infighting even under the yoke of foreign occupation. As the study observes, "A conflict within a conflict soon developed, with one Yugoslav force attacking the other while that force was already engaged against the occupation troops."

A case in point is the Montenegrin revolt against the Italians in 1941. The Italians, although strong and well equipped, found it necessary to enlist the assistance of Chetnik irregulars to suppress the insurrection. In return for keeping the area free of Partisans, the Chetniks were rewarded with arms, territory, and control of much of the surrounding countryside while the Italians restricted themselves to garrisoning cities. In this manner the "insurgents" were defeated.

In 1942, guerrilla operations were being conducted in the German sector, albeit more cautiously and on a smaller scale. Mines were laid, wire communications were cut, and roadside ambushes were well planned and vigorously executed. Guerrillas took full advantage of the remote, wooded mountains that characterize much of Yugoslavia to hide from pursuers and prepare for future operations. German reaction to these attacks, "... resulted in a large number of casualties and arrests, but accomplished little in effectively curbing the guerrilla movement. Nor did the shooting of hostages or the burning of homes of suspects and whole communities suspected of sheltering guerrillas achieve the desired results."

The next year saw the German situation in the Balkans become increasingly difficult. Guerrilla actions became larger and more aggressive while the Germans themselves had fewer units with which to meet the threat. In addition, the Italian surrender compounded the German manpower shortage while at the same time nearly doubling the area they had to occupy. At the same time, the German high command felt the need to defend Yugoslavia and Greece from a possible Allied seaborne invasion.

The German response to these dangers took three forms. First, they shifted units within the theater in order to insure adequate coverage of critical areas. This included an expansion of the Bulgarian area of responsibility, the temporary addition to the region of a combat hardened division from Russia, and various corps-level operations against known guerrilla concentrations. Most interesting, however, was the formation and use of company-sized units to conduct long range, long duration, Ranger-type patrols. These companies (unlike the preponderance of the German garrison units in the region) were composed of young, combat experienced soldiers who used a combination of stealth and subterfuge to identify, track, and attack insurgents. Although effective,

these units were not numerous enough to seriously affect the outcome of the campaign.

Overall, German activities were successful in inflicting casualties on the guerrillas, but these operations had little lasting effect. Despite serious losses of men and equipment, resistance continued to grow stronger. With Allied logistical backing, captured equipment, and a populace ready to revolt, the Partisans and Chetniks took on more of the characteristics of a regular army, complete with uniforms, a semblance of standardized equipment, replacement organizations, a functional chain of command, and rigidly enforced regulations. At the same time the insurgents became bolder by attacking German and Italian units directly; at one time during the confusion surrounding the surrender of the Italians, they were able to briefly shut down several key installations and obtain large stocks of war material.

By 1944 the German situation in the Balkans became increasingly distressed as the Allies threatened by air from Italy and by land from the east. At the same time, the Germans saw increasing defections from their Croat and Serb auxiliaries to the guerrilla side. Yet, despite their difficulties, the German army in the Balkans remained a powerful fighting force, with 500,000 men that could mass and crush whatever resistance the irregulars could put together. Although another series of operations against guerrilla units was successful, the collapse of German forces on the Russian front, and the ensuing westward retreat, soon forced the issue of the German occupation and made German antiguerrilla operations in the region moot.

The study is careful to note that the various guerrilla forces of 1944 were substantially different from those of late 1941. The change was so pronounced that the German and allied forces in the area "... expressed the view that the size, armament, organization, and operation of the Partisan units justified the Germans' considering them as an enemy on the same plane with the regular forces of the other nations with which the Reich was at war."

With the help of Allied assistance, the major guerrilla organizations (Partisans and Chetniks) had become fighting forces in their own right, and had earned that recognition by their enemy. It was a combined force of Partisans and Red Army soldiers that liberated Belgrade on 20 October 1944, and by doing so hastened the withdrawal of German forces and their collaborationist auxiliaries from the majority of the Balkans.

In conclusion, the guerrilla movement had a significant impact on the overall German war effort. As the study writes, "The resistance forces, with the assistance of the Allies and aided by the worsening German strategic situation, had finally been able to emerge as an organized force... and contributed materially to the liberation of their respective countries. In turn, these resistance forces had speeded the breaking of German power by tying down well over one-half million German troops and preventing their commitment to other fronts."



What lessons are there to be learned from the German experience in the Balkans, particularly Yugoslavia? And if a foreign force, such as NATO, were to impose itself on the Yugoslavian population, what sort of conditions would it face? Again, the study is a valuable guide. The study concludes, "the success achieved by the guerrillas against the Germans, Italians, and Bulgarians in the Balkans ... strengthened considerably the tradition of resistance to foreign occupation forces." And con-

tinues to say that, "... there is little doubt that a foreign invader today, from East or West, would be confronted with a formidable task of pacification following a successful campaign against the regular forces of the Balkan nations."

If some sort of multinational suppression of resistance to international will were to occur, the writers of the study felt that, to be successful, the occupier must, "... begin his administration with a clear-cut statement of policy, including a promise of eventual withdrawal ... and self determination for the people; a unified military command and distinct delineation of responsibility in the military and political fields; the assignment of trained, well equipped combat troops to the area; the taking of prompt and effective though not excessively harsh measures to quell disorders; and an extensive propaganda campaign to explain the purpose of the occupation and the benefits [of the maintenance] of law and order..."

Although written over forty years ago, the book's accounts of religious and ethnic violence during the German occupation sound as if they were right from today's headlines. The irony here is twofold. First, even the occupation by a hostile foreign power was insufficient motivation for Croats, Serbs, and Muslims to overcome their religious, ethnic, and political hatred to work together — even briefly — against a common enemy. Second, the experience of World War Two and the passage of time since then has made passion and hatred in the region stronger, and not weaker. Indeed, the atrocities committed by these groups on each other has only given the other side further justification to mobilize their respective populations and attack their enemies.

It is often said in military history circles that those who do not know the past are bound to repeat it. This book's eighty-two pages are a quick and valuable read and go far in explaining the difficulties the Germans faced in imposing their will on an unreceptive populace. While the world has changed significantly since the 1940s, to some extent the Balkans (particularly Yugoslavia) has not. Consequently, the lessons learned by the Germans half a century ago remain valid today and, considering the possibility of American involvement in that area, are worth close examination.

German Antiguerrilla Operations in the Balkans (1941-1944), CMH Pub 104-18, Facsimile edition, 1989, is available at the U.S. Government Printing Office in Washington, D.C. and costs approximately eight dollars. You may order a copy by calling (202) 783-3238 (commercial); copies may also be available at your regional Government Printing Office. Time spent reading this study is time well spent.

The 82d Airborne in Saudia Arabia

by Captain Sean Corrigan

The announcement that the 82d Airborne Division had begun to deploy to Saudia Arabia caught me by surprise. The announcement caught us all by surprise. Our combat focus had been south, in the Caribbean, Central America, and South America. Initially, we assumed that, as the seventh task force in the division's order of deployment, we would be watching this war on CNN. The task force commander, however, completed his announcement with a warning order to be prepared for immediate deployment. This warning order underscored the seriousness of the issue because the division had not fought as a unit since World War II. This significance was not lost on anyone.

I met with the scout squad leaders to gather our thoughts. Our most important issue was that we knew we were not trained to operate against a mounted, armored enemy in a desert environment. All of our training, and all of our focus had been on fighting a dismounted light infantry enemy in a woodland or jungle environment. Our focus would have to change quickly.

Not knowing how much time we would have prior to deployment to Saudia Arabia, we decided to concentrate on the skills we associated with an antiarmor defense: vehicle identification, reporting procedures, and calls for indirect fire. To give the platoon an idea of the time and space relationships of mobile warfare, I took my HMMWV 3,000 meters down the median of a freeway and drove toward them at 15 miles per hour. They were amazed at how difficult it was to see the vehicle, even through binoculars. As we continued to experiment, we tried to simulate calling for and adjusting fires on an advancing enemy.



The mood was rather somber as we realized just how difficult this mission would be for a dismounted scout platoon armed with rifles, grenade launchers, and our AN/PRC 77 radios.

At Fort Bragg, task force after task force hustled through issue points, packing each soldier's rucksack with ammunition and MOPP gear prior to squeezing into C-141 or C-5 aircraft for the long trip to Saudi Arabia. As the seventh task force in the order of movement, 3-504 Parachute Infantry Regiment had the luxury of a few days to analyze its mission, the threat, and the operational environment. The task force commander and the operations officer focused on the antiarmor defense (AAD), as opposed to the airborne antiarmor defense (AAAD). The assumption was that we would not be making an airborne assault into Saudi Arabia, Kuwait, or Iraq. Jumping was only an emergency contingency plan at that point.

As scout platoon leader, I reviewed my missions in a task force antiarmor defense. In a wooded environment, dismounted scouts use natural cover and concealment, along with much-practiced stealth, to occupy OPs for-

"The mood was rather somber as we realized just how difficult this mission would be for a dismounted scout platoon armed with rifles, grenade launchers, and our AN/PRC 77 radios."

ward of the main defense. With no organic firepower capable of killing a tank, the scout platoon did not intend to engage anyone. Previously, we had relied on our fieldcraft to remain unobserved as we reported enemy movement and called for indirect fire. This new threat, a fully mechanized force, and the new desert environment that offered little or no cover or concealment forced me to rethink my methods of doing business.

While I struggled with an unfamiliar mission, I had my squads researching the threat and the environment. Being highly industrious scouts, they dug up an incredible amount of information in a very short period of time. The soldiers had only a few hours to leave post to collect their TA-50 and deployment bags before returning to the battalion for lock-in.

During that time the snipers managed to buy enough graphite to supply each man's weapons cleaning kit. The dry graphite lubricant works far better than gun oil or Break Free, which only collect sand and dust in the desert.

The scout squads rushed out to the local hobby shop and bought plastic models of every vehicle that we knew the Iraqis had in their inventory. Each squad built, painted, and researched a few vehicles, then briefed the rest of the platoon on the weapon's capabilities and limitations. We took the models out to the regiment's PT area and set them up in open, hull defilade, and turret defilade positions. By scaling the distance separating the observer and the model to the scale of the model, we got a good feel for what the vehicles would look like at various ranges and in various positions. Individual skills training continued at a breakneck pace, but I still had not resolved the issues relating to the mission itself.

The issues every dismounted scout faces are security and protection, observation, and communication. Dismounted scouts in a desert environment have very few options in balancing survivability with mission accomplishment. My initial solution to all of my problems was to mount my platoon on HMMWVs, arm the vehicles with .50-caliber machine guns, and create a mobile scout/recon platoon. The hard, cold reality of a come-as-you-are-war precluded that quick and easy solution. The 82d Airborne Division's battalion scout platoons had not been mounted since the division traded in its M151 jeeps for HMMWVs, and there were not enough vehicles in the division to equip each of the nine scout platoons with four HMMWVs. We would have to make do with what our MTOE had given us and think harder about how we would accomplish the mission. Our tactics of infiltration by foot, observation from hide sites, and FM

communications would have to suffice in the desert. It was our technique that needed a complete overhaul.

By the 18th of August, the task force had closed on the brigade assembly area. Training began immediately. The desert environment presented challenges we had not encountered in our previous training. The extended distances, the lack of vegetation for cover and concealment, and the summer heat restricted our tactical movement to the night. The lack of ground water forced us to carry 11 quarts of water per man and to cache 50-gallon blivets of water well behind our OP locations for nightly resupply. The open terrain and lack of vegetation forced us to dig into the sides of sand dunes or under the sparse clumps of palm trees to hide from both the enemy and the scorching afternoon sun.

The first brigade, once fully deployed and equipped, began to train as a brigade for an antiarmor defense in our assigned sector. The training exercises extended from the last week of August into September. With tension remaining high due to the lack of friendly armor or mechanized forces in the theater, the 82d Airborne set off into the desert to try to create a defense. If the situation had not been so serious, my scout platoon would have been a funny site trudging through the sand under rucksacks over-stuffed with communications equipment, NVGs, binoculars, water, and MOPP gear. The defensive sector staggered us with its frontage and depth.

Communications at these extended ranges were unreliable and unclear. The AN/PRC 77 FM radios did not have the range to make effective communications, especially in the heat of the day. The scout squads quickly learned that the standard long whip antennas were insufficient. To increase our ranges, we used copper long wire directional antennas, suspended a meter off the ground by palm fronds. Additionally, we

grounded each radio with a wire and unpainted metal tent stake buried deep in the sand. Even with the modifications, communications remained poor during the day. I had to relay all reports to the TOC through the forwardmost rifle company in the main defensive sector, slowing the reporting process and cluttering an already overtaxed command net.

The next issue at hand was the lack of cover and concealment. The sand was so fine and loose that our efforts to dig in were futile. We could not carry enough sandbags to properly reinforce a hide site. Unable to gain any real cover, we had to settle for the concealment of dispersed clumps of palm trees or construct makeshift hide positions out of palm fronds. Inspecting the positions from the enemy's vantage, the hides were actually well concealed, but it was painfully obvious that they offered no protection from direct or indirect fire.

Concealing our paths into the hides was also a challenge. The soft sand and lack of vegetation made tracking our movements incredibly easy. Eventually, the wind would blow enough sand into the tracks to erase our signature, but the winds were not very reliable and the process was sometimes very slow. As a passive security measure, we used the buttonhook technique of bypassing our hide sites, then looping back into them in order to give us more reaction time if anyone was tracking us as we occupied each hide site.

Observation also presented new challenges. Even though there was no vegetation to block our lines of sight, the undulating dunes and the refracting light from the intense heat made vehicle identification difficult. Identifying personnel was not any easier. At extended ranges, camels looked very much like human silhouettes if they were facing the observer directly. The AN/PVS 4 and 7 NVGs were ineffective at extended ranges, even though the clear desert nights optimized the systems. The PVS 4 proved to be a



much better system at ranges up to 500 meters, but that was not nearly far enough.

After three days of preparation, the brigade conducted a full-scale rehearsal, with the division's armor battalion as the OPFOR. When 3-73 Armor attacked, I learned very quickly that my scout platoon was not yet tactically prepared to deal with a mobile enemy. We heard the vehicles long before we saw them, but pinpointing their location was impossible. Reporting was difficult and vague, with our radios faltering after days of near continuous use in the

desert heat. Through the dunes, the light tanks suddenly appeared, easily and rapidly crossing terrain that we had considered slow-go or even no-go. Before we could make effective calls for indirect fire, the enemy had passed us and was heading for the main body. The GSR section had also been unable to detect or report the enemy.

As scouts, we had failed our mission in two respects. We failed to make clear and timely reports, and we failed to put indirect fire on the advancing enemy. Additionally, we found ourselves caught between the enemy's

advance guard and its main body, with nowhere to run and nowhere to hide. It was painfully obvious that we needed to rethink our tactics and techniques, then retrain ourselves to correct those failures and avoid repeating the disaster.

In a detailed internal after-action review, the scout platoon identified several weaknesses, to include communications, reporting procedures, observation, cover and concealment, and logistical sustainment. Through seemingly endless training exercises and rehearsals, the platoon had the opportunity to continuously experiment and improve on techniques in preparation for a contingency mission of defending oil fields southwest of our initial sector.

Our new location had many advantages over the previous sector. The terrain was rocky, with many hills to provide excellent cover and concealment. By late October, temperatures had dropped to a much more tolerable level, reducing the physical stress on the soldiers. Additionally, we had all become acclimatized through the months of training in the desert heat. The new sector was much smaller, making FM communications slightly more effective. I had learned more about the IPB process, and had learned to work more closely with the S2 in selecting OP locations to cover likely avenues of approach. The entire platoon had become quite proficient at vehicle and aircraft identification and accurate, concise reporting procedures.

During the task force's external evaluation in late October, we felt much more ready and able to accomplish our mission. But as the evaluation kicked off, we realized that we had not yet solved the logistical problem. Three days into the mission, the scout platoon was bone dry, having exhausted the water supply we had carried in our rucksacks to our OPs.

"Fortunately, tactical air support and heavy divisions arrived before Iraq could or would attack. We avoided having another Task Force Smith."

We had done all that we could to reduce our loads and conserve water. Prior to infiltrating, we had stripped our MREs, taking along only the hydrated main courses. Crackers, cookies and dehydrated fruit all sap water from the body and make the soldier thirsty, while adding weight, volume and refuse to the load on the scouts' backs. Simply put, the nutritional value of those components did not warrant their extra weight or space, but a week's worth of them add up in the rucksack as a scout humps around the desert all night.

Eventually, the support platoon established forward logistics release points to which the scout squads could infiltrate under the cover of darkness. The system made for a lot of walking, but it struck the best balance between sustenance and security. The resupply patrols had to be extremely cautious during movement to the LRPs because each resupply offered the enemy an excellent opportunity to ambush the scouts or compromise the OPs. Prior to the enemy's probing attack, that is exactly what happened. We lost a three-man patrol and a cache site in the process.

When the OPFOR finally attacked, the scout platoon fared much better than it had in August. All OPs gave accurate, timely reports, giving the commander a better picture of the enemy's main and supporting efforts. Calls for indirect fire forced the enemy to button up, deploy into combat formations, and halt at obstacles. The hills and rocks helped keep the scouts hidden and protected from enemy observation throughout the attack. Even though we had made significant improvements, some fundamental problems still lingered.

While our radios were within range to communicate, stronger signals often blocked our reports over the command net as the battle progressed into the main defensive sector. Calls

for fire were not relayed quickly enough to fully capitalize on opportunities to destroy the halted enemy. Adjusting fires was slow and unresponsive, even for a simulation. Logistics had cost us three valuable men and compromised our location.

In after-action reviews, some possible improvements surfaced. To decongest the command net and improve scout calls for indirect fire, the evaluators suggested establishing a task force intelligence net between the S2 and the scout platoon leader. The FSE, colocated with the S2 in the main TOC, could eavesdrop on the net in order to avoid taking calls for fire over the task force command net. Since we had limited radios, this would require a trade-off. By reporting on an exclusive net, the task force commander and the company commanders would not be able to hear my reports as I sent them. Switching back and forth from frequency to frequency would not be any better because the problem of overloading the command net would still exist.

Resupply remained an issue. The task force antitank company had the most success in pushing water forward to the scout LRPs, but the resupply mission significantly interfered with the company's primary mission of establishing defensive positions and engagement areas. No technique was completely successful or secure. The evaluators had no suggestions or alternative techniques to offer. As scouts, we expected to be hungry and thirsty between resupplies.

By the time our evaluation ended, the coalition's strategy had changed, or at least our battalion's mission had changed. Any hopes of returning to Fort Bragg died as the 82d Airborne shifted its focus to the offense. The 3-504 PIR never again trained to defend against an armor force in the desert, but some of the lessons learned on the

screen line carried over into the offense.

As dismounted scouts, we came to realize that our ability to communicate and call for indirect fires was our only weapon against a mobile protected enemy. We learned our tactical limitations based on our radios' ranges, the environment, logistics, and the soldiers' physical strength and stamina. Most importantly, we gained an appreciation for the speed and mobility of an armor force, causing us to plan for a faster-paced fight over greater depths. We all realized just how tenuous and exposed our initial sector had been in late August prior to the arrival of heavy forces. As a lightly armed, unprotected, and dismounted task force, we could not have stopped a determined armor attack of any significant size. Moreover, our lack of desert training or experience prior to our deployment to Saudi Arabia complicated our early efforts. Fortunately, tactical air support and heavy divisions arrived before Iraq could or would attack. We avoided having another Task Force Smith.

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SCOUT MOUT: Model for Future Cavalry Training

by Lieutenant Colonel Kurt D. Norman and Captain George M. Schwartz

Armored Cavalry's Role In Regional Operations

The increase in the number of regional conflicts, coupled with the strong role the United States is taking in international affairs, has caused many units to update their Mission Essential Task Lists (METL) to include "regional operations." Instead of Marines or light infantry, the next U.S. involvement could include armored cavalry units on the troop list. The deciding factors will probably be the mission, the regional threat, and the terrain.

Cavalry units cannot deploy out of theater rapidly enough to accomplish missions such as noncombatant evacuation or antiterrorist operations. But given suitable terrain, armored cavalry units offer "more bang for the buck" in operations such as peacemaking, peacekeeping, and humanitarian/convo escort operations.

With a combined arms organization at troop-level, an organic howitzer battery in each ground squadron, and an aviation squadron with over 60 helicopters, an armored cavalry regiment's combat power supports the principles of economy of force and unity of command. The regiment's

own combat support squadron, military intelligence company, and engineer company reduce the joint task force commander's need to task-organize units to ensure the proper mix of combat, combat support, and combat service support.

More importantly, the cavalry's basic mission task list supports many of the operations a commander would require during a regional operation. Conventional mechanized forces generally require a thoroughly prepared battlefield with sufficient time (36-48 hours) to mount each operation. As the corps' covering force, the ACR is expected to react rapidly when ordered and to gain and maintain contact with hostile forces in a fluid environment. This is accomplished in the offense through zone, area, or route reconnaissance. Any one or all of these tasks can be expected in a low to medium threat theater. An ACR has the inherent capability to attack or defend (in a non-economy of force role) against both of these threat levels. Cavalry security missions such as screen and area security also have a direct corollary in regional operations, especially for peacekeeping operations.

This all leads to the conclusion that armored cavalry units, particularly ACRs, are well-suited for regional operations. Assuming that the United States will continue to get involved in regional conflicts, it is, therefore, a good possibility that the next cavalry mission could be a regional operation. As cavalry leaders, we owe it to our soldiers to prepare them for this future environment. How does an armored cavalry unit train for a regional operation? The Blackhorse Regiment recently addressed this question, and in the process developed a model for future training exercises.

A Methodology for Training Regional Operations

In the summer of 1992, V Corps directed a METL change for all major subordinate commands. The task "Conduct Regional Operations," with its numerous contingencies, was added. After years of the heavy-threat mentality, this subject was new to everyone, so the regimental staff conducted a detailed mission analysis and presented it to the regimental commander through a series of officer professional development seminars.

Scouts remount a Bradley Fighting Vehicle while conducting local security in a built-up area.



Using FM 25-100 as a guide, the first step was to determine the supporting tasks for each mission. Open media sources — especially television news — provided a lot of the information used to create models for analysis. Canadian and British operations in Yugoslavia, under the auspices of the United Nations, and the U.S. operations in Somalia were followed very closely. Eventually, we assigned each probable mission that supported leader and collective tasks.

All but one of the collective tasks were familiar at small-unit level; it was still basic “blocking and tackling” from this perspective. But the conditions for performance of these METL tasks had changed. Despite this difference, commanders could still formulate an assessment of unit training status through evaluation under the more common conditions.

The mission “Escort a Humanitarian Relief Convoy” was different. The subtask “Escort Supply Trucks” was a new one and had never been executed, let alone evaluated in the regiment. It was certainly common in Croatia and, with the possibility of U.S. units performing it in Somalia soon, the regimental commander directed his staff to focus on this one first.

Analyzing the Escort Convoy Mission

The regimental S3 section researched tactics, techniques, and procedures (TTP) for the convoy escort mission, and quickly determined there was little doctrine on this subject. However, some information was available from the regiment’s own history in Vietnam. While these accounts of the “Road-Runner” missions

did not provide detailed lessons learned, they provided insights on possible enemy tactics and provided general direction for further TTP development. We determined that the troop was the best unit to escort a convoy of up to 50 trucks and developed a recommended organization. Each convoy would have three serials: a small route recon team; the initial main body serial, light with trucks, but heavy with combat vehicles; and the rest of the main body with the majority of the supply trucks.

Assumptions were tested through the use of simulation wargaming. Aviation was also integrated and the TTP was further refined. We determined that the basic convoy organization worked, but that combat vehicles needed to be interspersed with the supply vehicles to offer more protection. Aeroscout teams could clear routes before the ground element reached the starting point, but indigenous forces committed to emplacing an obstacle would wait for aircraft to pass. Even attaching engineers to the route recon team did not always work. It established a pattern, and local hostiles could wait for this element to pass and then emplace an obstacle between elements. Built-up areas (BUAs), with their restrictive terrain, were ideal ambush sites and very challenging for the escort forces.

The wargaming proved several things. First, with its TO&E and doctrine, the cavalry is ideally suited for this mission. Second, at the basic scout section and platoon level, none of the tasks they perform escorting a relief convoy are radically different from the battle tasks they normally perform in support of the troop METL. Scouts react to direct fire, take actions at an obstacle, etc., almost the same way as before. Again, what is different are the conditions, and the most difficult condition is urban terrain. Finally, since reaction forces could sometimes take up to 30 minutes to arrive, small unit proficiency in these basic tasks needs to be at a T + level.

These last two factors validated what the regimental commander had been advocating for some time. In the training guidance, the regimental commander told leaders to identify the five or six basic tasks each small unit performs, and focus efforts on training these to standard. The keys to success are imaginative use of resources and task repetition. Looking at the upcoming Hammelburg densities, the regimental commander issued guidance to build the training scenario for “Scout MOUT” around a regional operation to prove his points on training and to evaluate troop performance of the convoy escort mission.

Training Cycle

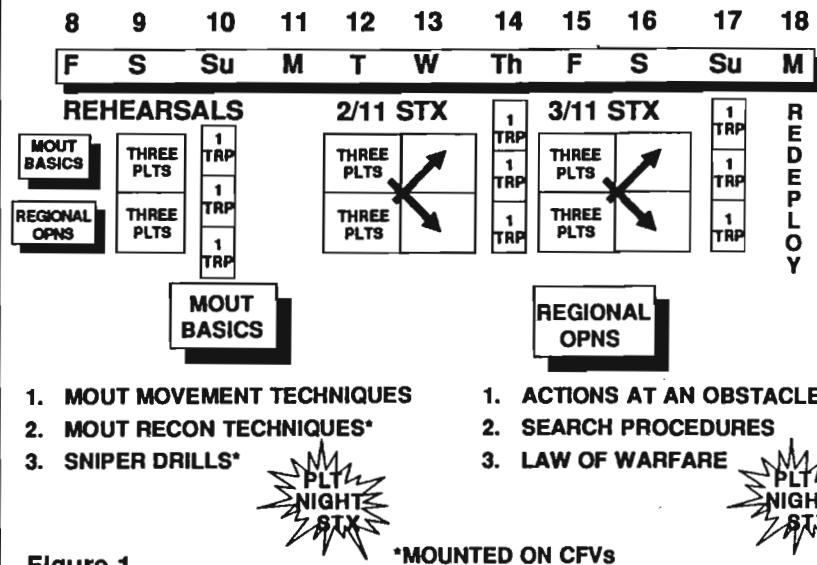


Figure 1

Scout MOUT Exercise Development

In the spring of 1992, while resourcing FY93 Annual Training Guidance, the regimental S3 signed up for Hammelburg, an Allied Major Training Area. This is a small training area, less than 36 square kilometers, but it has one of the world's best MOUT training facilities — Bonnland.

Military Operations on Urban Terrain has always been an identified weakness in the Blackhorse because it was never considered a mission essential task, and hence never properly resourced. The regiment's trainers had begun to consider MOUT a change in training conditions (built-up terrain as opposed to the normal open terrain) rather than a separate task in itself, and decided to sign-up for two ten-day periods to train scouts in MOUT basics. The January 1993 density fit nicely into the regiment's calendar because it came after a busy first quarter that included a long gunnery/CMTC deployment and holiday block leave for the entire regiment. It would be a good way to get back into the training mode. The name Scout MOUT was readily adopted.

Hammelburg actually has two MOUT facilities: the 50-building town of Bonnland and the 12-building Hundsfeld village. The regiment scheduled both MOUT sites and the "Waldkampf Bahn" (forest fighting training facility) because it best supported tracked vehicle maneuver. As opposed to the MOUT training site at CMTC, tracked vehicles are permitted on any improved trail or road in Bonnland, allowing scouts to train as they would fight. An asphalt tank road also circles the entire training area, but traffic is only permitted Thursdays through Sundays because of range operations the rest of the week. Aviation could not be incorporated into the exercise due to numerous German flight restrictions in the area.

The regimental training officer developed a progressive training scheme based on the commander's guidance and resources available. Each squadron would receive a three-day training package. The training focused on the scout platoon, and was organized into two different areas: MOUT Operations and Regional Operations. Each area had three platoon training stations; platoons rotated stations every three hours. At the end of the day,

each scout platoon was evaluated in the performance of those three tasks through a night situational training exercise (STX). The next day, platoons went to the other area, and began the process again. The third day was considered the "graduation exercise," with each troop (-) escorting a convoy through hostile terrain.

An entire regional scenario was developed for the country of "Hamm-land." The scenario supported all of the platoon and troop training. The Hammlandians, an ethnic minority, had seceded from "Neuvolkland" after the country's long-time dictator had died. The larger Slovenian republic is determined to protect the rights of the ethnic Slovenians in Hammland, and vicious fighting has broken out. Many people in the region are on the verge of starvation, and the Blackhorse is a part of a United Nations relief effort. Cultural handbooks were manufactured and distributed to all units. A skit was developed using linguists from the MI company for the inprocessing brief to reinforce the differences in the factions.

The regimental staff judge advocate (RSJA) also developed a realistic set of rules of engagement (ROE) to support the entire scenario. The ROE state in effect at all times was AMBER. The governing condition for this state was that we were not at war. Soldiers were instructed to use only the minimum force necessary to control a situation without endangering friendly units or risking the success of the mission. All personnel were to take measures to minimize the risk to civilians. ROE RED only came into effect in the event of war, but still restricted certain reactions.

Platoon Training

The actual MOUT training encompassed dismounted movement in built-up areas, reacting to direct fire (sniper), and reconnaissance of a built-up area by a scout platoon. The dismounted

movement station taught individual scouts and teams the basics without getting into in-depth infantry tactics not appropriate for reconnaissance. It culminated in a 15-station MOUT obstacle course that allowed scouts to move confidently in urban terrain. Reacting to a sniper was geared towards sections, and reinforced the MOUT principles of suppress, isolate, and clear. The MOUT recon station taught a mounted scout platoon the drill for reconnaissance of a BUA using a three-section organization. The night STX evaluated the scout platoon's ability to reconnoiter a built-up area and react to fire from a two-man sniper team. One sniper would always quickly attempt to escape after contact to test the platoon's ability to isolate the building. The other remained behind to evaluate the platoon's clearing procedures.

Regional operations focused on three critical areas. The RSJA presented a class on the Law of Land Warfare and used a hands-on approach to cover situations soldiers might encounter in a region stricken by factional conflict. Another team instructed a course on proper EPW search and handling

techniques, and evaluated performance using uniformed and civilian combatants.

The third team trained platoon actions at an obstacle and hasty breach drills with an attached engineer squad. This night STX was especially difficult. The platoon would encounter a point minefield "guarded" by armed indigenous personnel. These local fighters never threatened the platoon and, in accordance with the Law of Warfare and the ROE, the platoon could not initiate hostile actions against them. While the platoon attempted to negotiate with these personnel, a machine gun ambushed them from a flank. The platoon had to quickly decide how to treat these "guards" (they are never able to determine which faction fired at them) without committing a war crime and then still reduce the obstacle.

Trainers were experienced officers and NCOs nominated by the squadrons. They attended a two-day Observer/Controller/Evaluator (OCE) academy designed and executed by the regimental training officer and the regimental scout master gunner. In order to train MOUT Recon and

React to a Sniper, they had to actually develop the standard drills and then the evaluation checklists because FM 17-98 and FM 17-98-1 do not cover these tasks in depth. Throughout the execution of the exercise, the regimental S3 acted as the senior OCE and the training section maintained the training standards while 1/11 managed the training assets and administered the schedule. OCEs also evaluated platoons during the night STX and the troop integration exercise. First Squadron's troop commanders acted as the troop OCEs for the integration exercise because they were now the most experienced in the mission.

As opposed to regimentally sponsored events in the past, SCOUT MOUT was not a competition; it was training to a standard first, then receiving an evaluation. During the day-time training, OCEs walked units through by the numbers and made on-the-spot corrections to ensure that everyone performed to standard. Only after passing through these "gates" were platoons ready for the night STX.

The "Graduation" Exercise

On Day 2, troop commanders also received leader training on convoy escort from the regimental S3. In a 90-minute class, he covered the TTP developed from the regimental staff seminars, recommended task organizations, and discussed lessons learned from previous iterations. Immediately after the class, the commanders received a squadron OPORD; each troop would escort 10 supply trucks the next day with three-hour blocks between convoys. Commanders had the rest of the day to do their own intelligence preparation of the battlefield and devise a plan.

Each convoy encountered at least five different situations:

- A hasty point minefield usually laid in between the first and second



A convoy moves past a "disabled" supply truck in the village of Bonnlund.

1/11 ACR's Recommended Convoy Organization Based on Integration Exercise Experience

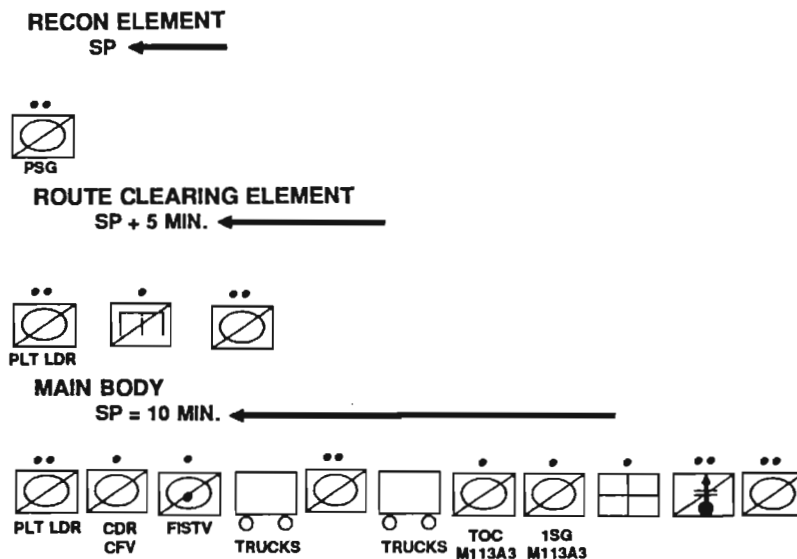


Figure 2

serials. It could be unguarded, covered by sniper fire, or covered by mortar fire. In each case, rapid obstacle clearing drills ensured the convoy remained safe.

- A roadblock manned by either hostile or sympathetic host nation partisans demanding to see the convoy's commander. A good understanding of the regional handbook was absolutely necessary here, and if the scouts negotiated, they could at the very least pass, but might also receive some valuable combat critical information.

Convoys also encountered an obnoxious BNN (Blackhorse News Network) camera team trying to get a scoop here. They were interjected to raise the stress level — they would persistently pester leaders attempting to talk to the locals — and the tapes they made were also used in the troop after-action reviews.

- A squad-size ambush that targeted the soft-skinned vehicles. This force would not attempt to exfiltrate until it was either destroyed by direct fire or received indirect fire from the troop's mortars.

- A built-up area with sympathetic civilians who mobbed the lead relief

supply truck. After the convoy halted, a sniper would open up on the truck, scattering the civilians, and wounding one in the process. The troop commander had the option here of ordering the convoy to attempt a bypass, or have that building cleared and the damaged truck pushed off the road. In either case, there were still friendly and civilian personnel to deal with.

- A machine gun team on the far side of town ambushed any members of the troop attempting to reinforce the forces engaged with the sniper. The only option here was to react to the direct fire and clear the building.

Convoy Escort Lessons Learned

First Squadron's experience with the convoy escort was typical. All three missions were successful, but experienced some problems. Each commander met the five situations with varying degrees of difficulty and resolution. Basic skills, such as road marching, actions at an obstacle, actions on contact, and reporting, were executed to standard. However, tricky situations involving either passive or hostile action by one of the host

nation's factions required quick thinking or refined reaction by junior leaders and their subordinates. This did not go as well as we hoped. For example, every roadblock in situation #2, manned either by hostile or sympathetic local fighters, was forcibly removed. Negotiations would have been better, circumventing possible violent situations.

Each convoy did make it to the release point within the three-hour standard. Each convoy ended up losing from one to two UN relief supply trucks, and at least two to three WIAs. Valuable lessons learned were collected during the convoys and at the AARs. The major ones include:

- Our scouts were too aggressive toward the indigenous population. In some cases, they violated the civil rights of unarmed civilians while attempting to establish local security. Scouts cannot treat every civilian, even the armed ones, as "contact." If that BNN news team had been for real, some unfortunate events would have been displayed world-wide, creating an international incident for the U.S. Relations with the locals are very sensitive in nature, and an in-depth knowledge of the regional situation and the ROE are essential to success.

- Almost every troop organized its convoy differently, but all provided for a lead reconnaissance element. The recon teams that deliberately reconned the route had more success in clearing the route. When they identified obstacles, they breached a lane and then continued with their mission, leaving a squad to overwatch it and prevent reseeding. In future convoy escort operations, commanders want to test the possibility of having a squad or section from the recon element double-back along the route to discourage sabotage attempts. Commanders also unanimously decided to eliminate the M577 from future convoys because of its inability to maintain the rate of march.



Scouts practice urban movement during MOUT basics training.

- Working in coordination with non-radio equipped supply trucks, the commander must develop a common SOP for actions drills and signaling. One recommendation was to use flags to signal from the CFVs to the trucks, and to use lights to signal from the trucks to the escort vehicles.

- Indirect fire was almost never used due to the rapid nature of partisan tactics. What commanders can do is plan targets on possible ambush sites, and then continuously update the mortar priority target as the convoy approaches and passes targets. This increases the effectiveness of the mortars even though it is a hip-shoot.

- While the engineer assured us that the “pop-and-drop” technique for clearing hasty point minefields would not crater the road and make it unpassable for wheeled traffic, some were concerned with using the technique in a BUA. Secondary explosions could cause unwanted collateral damage to civilian property. Grappling seems to be the preferred alternative.

Assessment of the Exercise Planning and Execution

Scout MOUT also set the standard for future training events in the Blackhorse.

The feedback from the scouts was extremely positive. Many thought it was about time the regiment took a close look at MOUT. Others enjoyed the challenges of urban terrain. Leaders appreciated the opportunity to train tasks to a standard prior to any evaluation.

The days of plenty are over, and we must make imaginative use of the resources available. The most highly praised training event in recent regimental history did not bust the budget

due to the use of vehicle hot-seating, the low OPTEMPO mileage brought about by the standardized training plans, and the use of internal assets to meet some of the transportation requirements. Redundancy was also eliminated by designating one squadron host to provide all the base camp and training requirements. The host unit command post was invaluable as the Exercise Control Center, because they coordinated the movement of all assets and units (including OPFOR), published training schedules, and ran the net control station.

Conclusion

Although the exercise was titled Scout MOUT 1993, many different MOSs participated in the intense training regime. All departed with the conviction that the training was worthwhile and that missions of this nature require special attention. The Blackhorse Regiment is unique in its capabilities and feels confident in its ability to meet the demanding requirements of units deployed for a regional operation.

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Captain George M. Schwartz is a Distinguished Military Graduate of Mansfield University of Pennsylvania, and he received a Regular Army commission in Armor in 1984. He has served as a platoon leader, tank company XO, and maintenance officer in the 2d Battalion, 81st Armor. After AOAC, he served as the maintenance officer, Fox Troop commander, and unit restationing officer for 2d Squadron, 11th ACR. He is currently the training officer for the 11th ACR.

Brigade Deep Operations: Task Organizing for Victory

by Captain William K. McCurry Jr. and First Lieutenant Joel R. Phillips

"Exploitation of depth in operations demands imagination, boldness, foresight, and decisiveness in leaders. Commanders must see beyond the requirements of the moment, actively seek information on the area and the enemy in depth, and employ every asset available to extend their operations in time and space."¹

Somewhere at the National Training Center... Time NOW...

"Bravo Zero Six, this is Golf Zero Six, 36 BMPs and 12 T-72s have penetrated Phase Line TEXAS and are moving west. My task force reserve has been destroyed."

"Roger, Golf Zero Six, break; Bravo Zero Five, this is Bravo Zero Six. Move the brigade reserve to attack by Fire Position Alpha Zulu now!"

"Bravo Zero Six, this is Bravo Zero Five. The brigade reserve was forced into MOPP 4 by an OPFOR chemical attack. As they were repositioning they ran into an OPFOR FASCAM minefield, break; the reserve is down to two M1s and three M3s and can't be in position for at least 12 minutes."

Bravo Zero Six took off his CVC helmet and threw it on the top of the tank, narrowly missing his surprised loader. Throughout the preparation of the order and the maneuver rehearsal the brigade commander had counted on his battalion task forces to buy the time needed to react to the enemy's main attack. But their fight with a forward detachment, and then the advance guard had not gone as expected. Chaos filled his command net. Confusion reigned. Command and control deteriorated further when the OPFOR regimental main body rolled

forward at maximum speed to exploit the success of the advance guard. The company that opposed the OPFOR main effort was quickly overrun.

Bravo Zero Six cursed under his breath. Everything had happened so fast. There was no time to implement the plan that the brigade had so painfully refined during the past 36 hours. If he could have slowed the enemy down, disrupted and attrited their lead elements, the outcome might have been different. His brigade had been defeated. Now there was nothing left to do but endure another grueling AAR.

The problem confronted by Bravo Zero Six is not new. The heavy maneuver brigades of the U.S. Army lack the organic reconnaissance and surveillance assets to effectively fight a deep operation as depicted in FM 100-5, *Operations* and FM 71-3, *The Armored and Mechanized Infantry Brigade*. But the lack of organic assets does not eliminate the requirement to fight the deep operation. FM 71-3 states that "Brigades can direct battles against enemy battalions and regiments up to 15 kilometers forward of the FLOT..."²

Brigade Deep Operations

As often practiced, the brigade deep operation only extends to the battalion scouts located five to seven kilometers forward of the main combat force. The remaining gap is supposed to be covered by army aviation assets, electronic warfare systems, and close air support (CAS). Unfortunately, these systems are seldom under the direct control of the maneuver brigade commander. As a result, brigade targets are ignored, or not covered due to

lack of assets. An option available to the brigade commander to overcome this limitation is to task organize a brigade deep operations force.

Such a force would concentrate on filling the reconnaissance and surveillance (R&S) void between division assets and battalion assets. "Throughout history, military leaders have recognized the importance of R&S. Gaining and maintaining contact with the enemy is essential to win the battle. Our own military history contains many examples where our knowledge of the enemy, or lack of knowledge, directly led to victory or defeat."³

Effectively increasing the R&S zone allows the commander to employ one of the key tenets of our AirLand Battle doctrine — depth. "Depth is the extension of operations in space, time, and resources. Through the use of depth, a commander obtains the necessary space to maneuver effectively, the necessary time to plan, arrange, and execute operations, and the necessary resources to win. Momentum in the attack and elasticity in the defense derive from depth."⁴

Organization for Brigade Reconnaissance

A brigade going into combat today would require a reconnaissance organization under its direct control to act as the brigade commander's "directed telescope."⁵ Brigade observation posts are a possible answer to today's warfighting needs. Although a separate, independent reconnaissance troop would be preferred, this solution is not in the cards for the near future. The alternative is to do nothing, or organize existing forces within the brigade.

The Brigade Scout Platoon

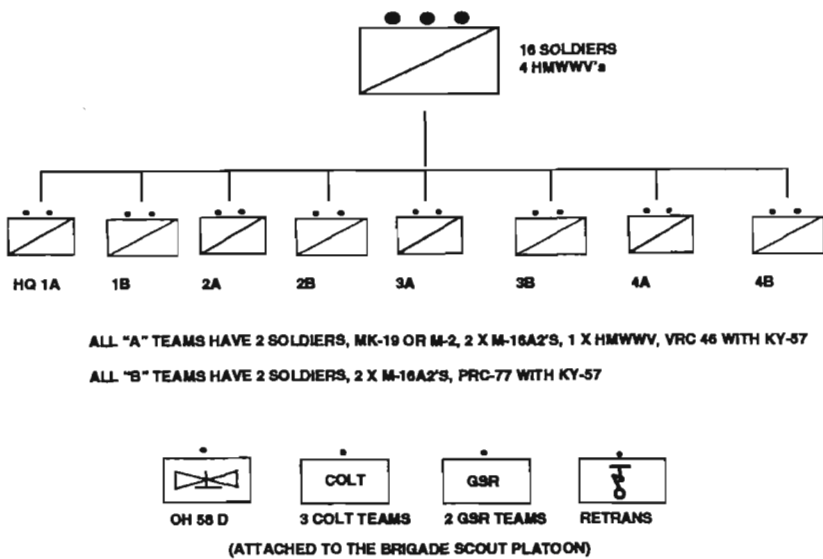


Figure 1

According to FM 71-3, *Armored And Mechanized Infantry Brigade*, the effective task organization of the brigade assets is a critical part of the brigade command and control (C²) process. Furthermore, a specified task of that C² process is the positioning of "intelligence resources to facilitate fighting the battle in the brigade area of operations."⁶ The brigade S2 is responsible for making recommendations to the commander "on changes to the task organization required to accomplish the reconnaissance, surveillance, and counterreconnaissance plan."⁷

Where can the brigade pull reconnaissance forces from? One technique is to "task organize" the scout platoon from the reserve battalion under brigade control. Under the new ten-HMMWV scout platoon Modified Table of Organization and Equipment (MTOE) the brigade could adequately meet its deep R&S requirements by tasking teams from the reserve task force's scout platoon and augmenting their scouts with Ground Surveillance Radars (GSRs), Combat Observation/Lasing Teams (COLTs) and OH-58D Kiowa helicopters. To make this organization effective takes prior training and good standard operating procedures (SOPs).

Tasking four HMMWVs, each manned with four scouts per team, could provide the brigade up to eight observation posts (4 x 2 man dismounted OPs and 4 x 2 man OPs located near the HMMWV). Combine this with two GSRs from the brigade's slice, and three COLTs, and the brigade has 13 OPs to assist with the deep fight. In addition, one of the brigade RETRANS/Radio (FM) teams

will be tasked to ensure long range communications (see Figure 1).

The change to the HMMWV-equipped scout platoon adds a degree of stealth that was lacking with the M3 Bradley. Although the HMMWV lacks the antitank weapon systems the M3 provided, it should be remembered that the scouts primary mission is reconnaissance and surveillance, not fighting. One vital piece of M3 equipment that is now missing from the HMMWV scout organization is a thermal night sight. This MTOE deficiency will soon be corrected. With this exception, the equipment necessary for the scout platoon to accomplish the deep R&S mission is already a part of its MTOE or is available within the army supply system (see Figure 2).

Brigade Reconnaissance Techniques

The brigade deep operation is planned by the brigade staff. The brigade executive officer controls the deep fight and coordinates deep operation activities from the brigade main command post. He is assisted by the

Equipment List

PER TEAM

- 1 x M-998
- 1 x GPS
- 1 x OE-254
- 1 x DIRECTIONAL ANTENNA
- 2 x COMPASS
- 1 x PRC-77 WITH KY-57
- 2 x PRC-77 BATTERIES
- 1 x VRC 46 WITH KY-57
- 1 x SPOOL OF COMMO WIRE
- 1 x TA-312 WITH BATTERIES
- 1 x TA-1
- 2 x BINOCULARS (20 x 80)
- 3 x PVS-7s
- 10 x VS-17 PANELS
- CAMO NET
- PYROTECHNICS
- CLEAR TRASH BAGS
- 3 x 5 GALLON WATER CANS
- 2 x 1 GALLON COLLAPSIBLE WATER CANS

PER SOLDIER

- LARGE RUCKSACK WITH FRAME
- 2 x 2 QUART CANTEENS
- 2 x 1 QUART CANTEENS
- 1 x MAP OF AREA OF OPERATIONS
- 25 METERS 550 CORD
- POCKET KNIFE
- NOTEBOOK, PEN, PENCIL
- PROTRACTOR
- 9 x MREs
- FIELD UNIFORM PER SOP
- SLEEPING BAG
- SIGNAL MIRROR

WEAPONS PER TEAM

- 4 x M16A2
- 1 x M2

Figure 2

Brigade Deep Operations Template (Offense)

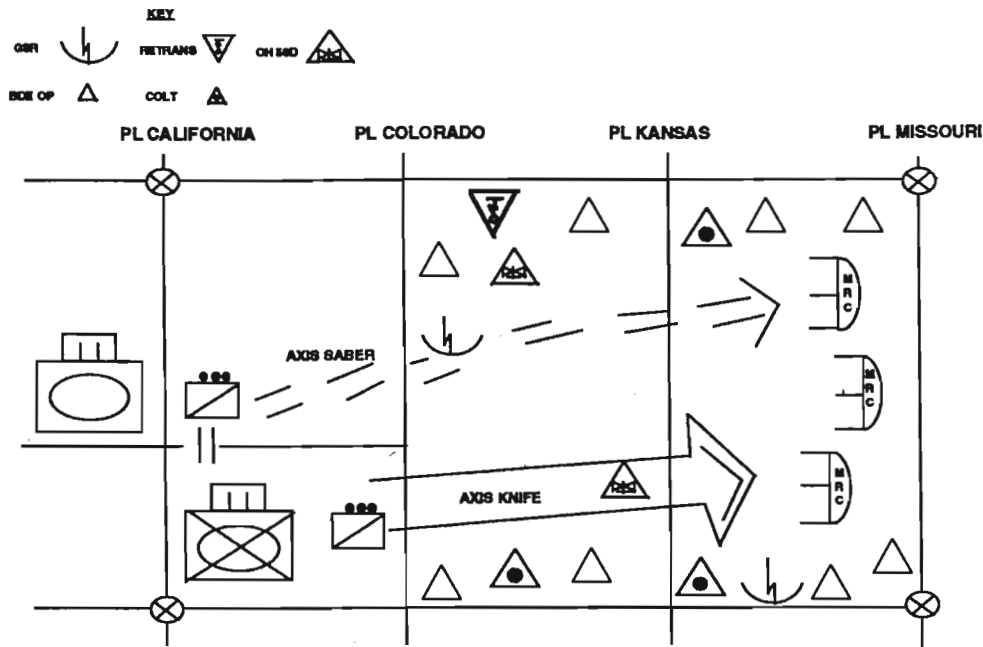


Figure 3

currently, they can begin harassing and attriting enemy forces with artillery and CAS. The Ground/Vehicular Laser Locator Designator (G/VLLD) that the COLTs carry forward allows the deep force to attack targets with the pinpoint accuracy that Copperhead provides. The benefit of this technique is that the brigade commander receives the intelligence necessary to fight the deep operation, and he has a valuable asset capable of reporting critical information throughout the battle, such as where and when the enemy commits his reserve.

brigade tactical command post and the brigade RETRANS to maintain FM radio communications.

In the offense, the brigade conducts its deep fight throughout its zone of attack up to the objective and beyond to a limit of advance. The mission of the brigade OPs is to conduct reconnaissance along the axis of attack and of the objective. Surveillance would then be established on the objective, which will be designated a deep engagement area. The designation of the deep engagement area is the result of a joint staff effort between the S3, S2, FSO, Army Air Liaison and Air Force Liaison. This allows the brigade commander to fight the deep battle with a true combined arms team that has a dedicated R&S asset in place to provide the intelligence necessary to direct the fight. (See Figure 3)

In a deliberate attack, the brigade deep fighters would begin infiltration 36 to 48 hours in front of the main body (they will carry a basic load of supplies to operate 72 hours before re-supply). If helicopters are available, the dismounted OPs or the vehicles

can be inserted near the objective. The ground infiltration would ideally begin under the cover of darkness. Assisted by the GSRs, COLTs and possibly the OH-58Ds, the ground teams would begin movement in teams of two vehicles each using a bounding overwatch technique. In addition, one battery from the brigade's direct support (DS) artillery battalion must be in position to provide indirect fires along the entire infiltration route.

To be successful, the teams will have to use the concealment provided by the terrain and the patience to stop, look, and listen, as they progress along their route. The brigade S2 and the scout platoon leader will conduct detailed intelligence preparation of the battlefield (IPB) to determine the infiltration route and to identify potential danger areas. The progress of the deep operation force will be monitored by the brigade S2 over the operations and intelligence net.

Once in position, they will be able to provide the brigade commander critical information up to 15 kilometers in front of his main force. Con-

In the defense, the concept works much the same way. A major difference is the brigade's deep operations force does not have to infiltrate through enemy lines to get to the objective and establish deep engagement areas. The IPB process will identify the enemy's most likely avenues of attack, and the brigade staff will plan the deep engagement areas along those avenues. Target reference points (TRPs), carefully marked in each engagement area, allow the deep force to quickly send spot reports and accurately target enemy vehicles, which increases the lethality of the deep fight (see Figure 4).

The brigade deep force will be positioned to observe deep engagement areas with the COLTs and OH-58Ds having initial priority of fires within the brigade. As in the offense, one battery will be positioned so that it can range the deep engagement areas with Copperhead. In addition, the brigade deep force will be in position to support other combat multipliers, such as army aviation and CAS.

Brigade Deep Operations Template (Defense)

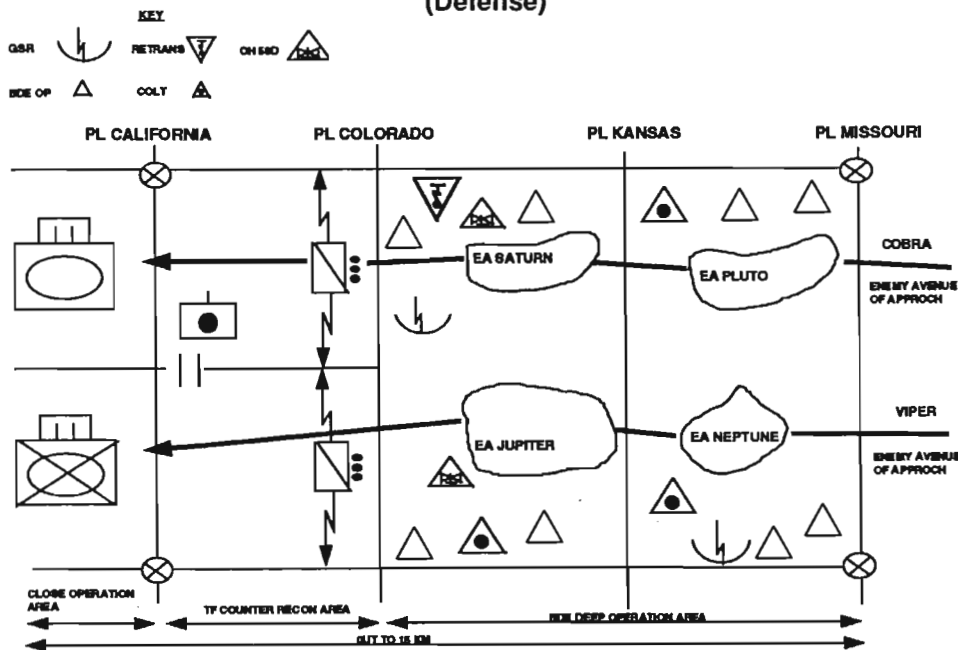


Figure 4

Notes

¹FM 100-5, *Operations*, Washington, D.C., Headquarters, Department of the Army, May 1986, p. 17.

²FM 71-3, *Armored and Mechanized Infantry Brigade*, Washington, D.C., Headquarters, Department of the Army, May 1989, p. 1-1.

³FM 34-2-1, *Tactics, Techniques and Procedures For Reconnaissance and Surveillance and Intelligence Support to Counterreconnaissance*, Washington, D.C., Headquarters, Department of the Army, 19 June 91, p. 1-1.

⁴FM 100-5, p.16.

⁵Van Creveld, Martin, *Command In War*, Harvard University Press, Cambridge, Mass., 1985.

⁶FM 71-3, p. 2-2.

⁷*Ibid.*, p. 4-16.

This organization allows the commander to increase the depth of the battlefield in terms of terrain and time. Based on a 20 KMPH rate of march, the brigade OPs can provide the commander up to 90 minutes warning of approaching enemy forces. When combined with the effect that air and artillery will have in attriting and disrupting the enemy's echelons as he attacks, the commander has the opportunity to establish the conditions for victory.

Conclusion

Task organizing the deep operations force at brigade makes sense. It is the only way to execute AirLand Operations doctrine with the current MTOE organization. This technique can be an important part of battlefield success. It requires extensive training and practice to be effective. Task-organized brigade deep operations forces should be seriously considered as a part of every brigade's warfighting techniques. If we went to war today, the brigade would require a reconnaissance organization under its direct

control to act as the brigade commander's "directed telescope." We must train in peace as we intend to fight in war. A brigade deep operations force is a possible answer to today's warfighting need.

"Bravo Zero Six, this is Bravo Zero Five. Deep OP One Alpha has identified the regimental main effort moving east along Axis COBRA, break; He just passed through Deep Engagement Area PLUTO, and his strength is

down to 24 BMPs and seven T-72s, over."

"Roger Bravo Zero Five. Execute Trap Play Lightning now!"

"Wilco, we estimate our forces will be in position and set at least five minutes before the enemy arrives at Phase Line Colorado."

Acknowledgement

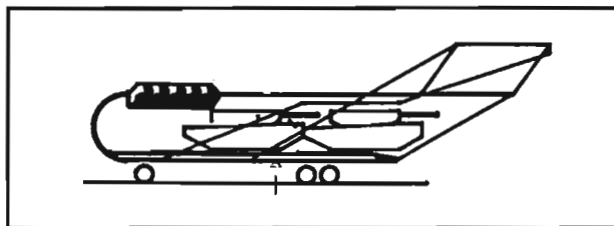
We would like to thank Major John F. Antal for his assistance and contributions in preparing this article.

Captain William K. McCurry Jr. is the S2 of 1st Brigade, 1st Infantry Division (Mech). He served as the S2 of 2-34 Armor Battalion during Operation DESERT SHIELD/STORM and an NTC rotation. His previous assignments include company FSO, artillery recon and survey officer, and artillery platoon leader. He is an ROTC graduate from Northwestern Oklahoma State University.

First Lieutenant Joel R. Phillips is currently the assistant S2 for 1st Brigade, 1st Infantry Division (Mech). He graduated from the University of Iowa in 1989, attended Military Intelligence Officer Basic Course, and then Ranger School before serving as a ground surveillance radar platoon leader and company executive officer in the 102d MI Battalion, Korea. He then served as the assistant S2 for 3-37 Armor Battalion.

Gliders Carrying Main Battle Tanks?

by Major E. C. Parrish III



It's an emotional issue and, as a pair of United States Military Academy engineers have determined, one well worth facing.

As his senior-year Capstone project, Cadet George Joseph Kopser conducted a preliminary design study of a glider to insert two-tank teams on drop zones. When he briefed his concept to the prestigious American Institute of Aeronautics and Astronautics' Minta Martin Student Competition, he won the oral-presentation contest.

Jet-towed gliders clearly intrigued aerospace engineers attending the event, hosted by the Massachusetts Institute of Technology.

"You could've heard a pin drop," Kopser said. "The idea's so radical nobody's considered it, but it makes sense. I used *ARMOR's* article ("It's Time to Consider Glider Delivery of the M1 Abrams," September-October 1992) as my operational concept. The judges thought it was a great approach, and they said the design I presented might very well work and certainly is worthy of further study."

His instructor, Colonel Kip P. Nygren, agrees:

"We certainly can build the glider using available materials, and we can tow it with today's jet transports,"

Nygren said. "Joe's idea, a joined-wing design,* is a clever approach. It'll have tremendous strength, shorten the wingspan to just 20 feet more than a C-130's, and weigh less than a conventional wing with as much surface area." (*Julian Wolkovitch invented the joined-wing aircraft, for which he received a patent on June 24, 1974.)

The question is, should we build it?

According to Nygren, that decision is best left to force-development experts.

"This concept will give them the opportunity to re-look the whole process of airborne deployment and resupply. They'll need to answer some questions. 'What do we want to move by air?' 'How long do we want it in place?' 'How much need is there to produce an armor force on the ground in a hurry?'"

But theoretically, gliders could double each cargo jet's load.

"Essentially, the C-5-glider combination is another airplane," Nygren said. "The combination could carry as much as two C-5s at a lot less cost. The big question is: what extra capability, above and beyond that which we have now, does the glider give us?"

And there are some good answers.



One battle precedent for glider-borne tank delivery was an unsuccessful one. The British 6th Airborne carried American-made M22 Locust light tanks in their Hamilcar gliders when they assaulted across the Rhine in 1945. Undergunned and lightly armored, the Locusts were outclassed. The author's concept involves transport of the M-1 series in large, C-5A-towed gliders of a "joined-wing" design. Photo: National Soaring Museum

"If we load the glider with tanks, we can fill up the C-5 with support vehicles and supplies," Kopser said. "After initial deployment, gliders nearly double the loads we can carry into a theater by air; not to mention, they're the best possible resupply vehicles for paratroopers until we get a support base going."

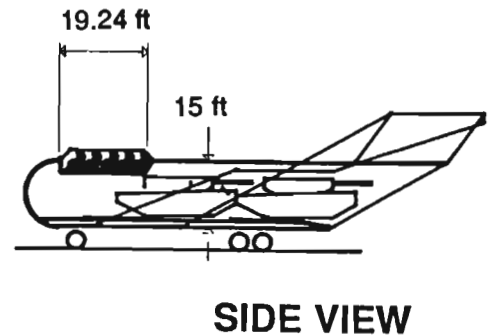
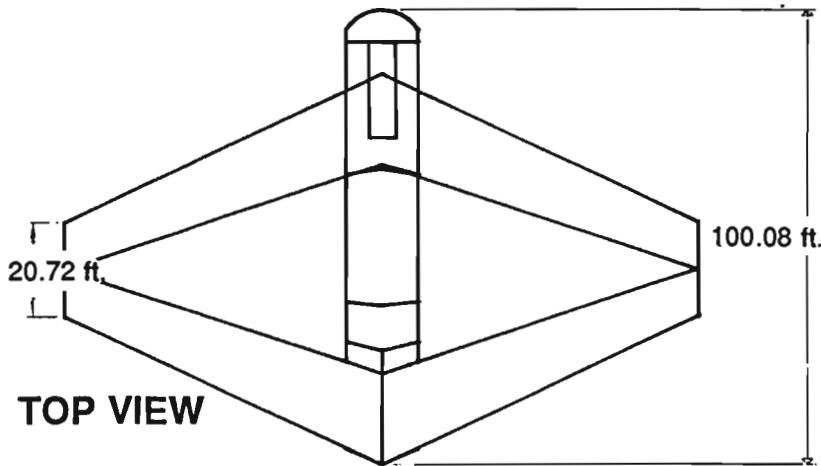
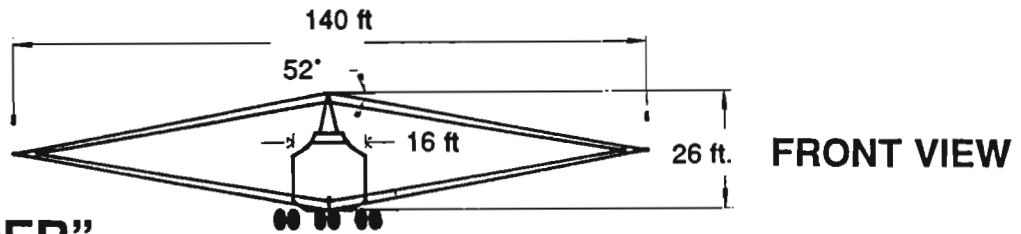
That's because properly designed gliders can land heavy loads on unprepared airstrips and drop zones, something the Air Force's cargo planes can't do; and that defines the issue.

Here's the problem: currently, if we deploy the 82d Airborne Division or special operations forces, they must go to war without main battle tanks.

Today, paratroopers can attack within hours of commitment, but U.S. tanks may not arrive for weeks. That's a long time for the 82d to be a "line in the sand" as in Operation DESERT SHIELD, and it precludes using tanks at all in special operations. (See "The 82d Airborne in Saudi Arabia" by CPT Sean Corrigan on Page 32.)

Seaborne transports are too slow for contingency operations, and geography limits their debarkation points. Plus, if the target nation is hostile, we might have to force a seaport as well

“XCG-140 GLIDER”



Three-view Sketch of a Joined-Wing Glider Design

as an airhead just to get tanks on the ground.

Because unfriendly nations are unlikely to host U.S. tank units, forward-deployed armor historically is in the “wrong place at the right time” for contingencies. And, as the U.S. closes strategic overseas posts, the chance of using pre-positioned tanks grows even slimmer.

Transporting tanks by cargo jets is impractical. A C-5 Galaxy can carry only one M1 Abrams at time, and runway requirements preclude delivering that tank to paratroopers unless there are sophisticated airports.

Yet, our post-cold war, potential adversaries arm themselves with main battle tanks, meaning our paratroopers must be ready to fight them. Like it or not, light infantry can’t move as fast and doesn’t pack as much punch as armor, which puts our toughest soldiers at a severe disadvantage.

Though disadvantages are great for drama and movie heroics, big guns and tough armor are more practical when lives depend on the outcome.

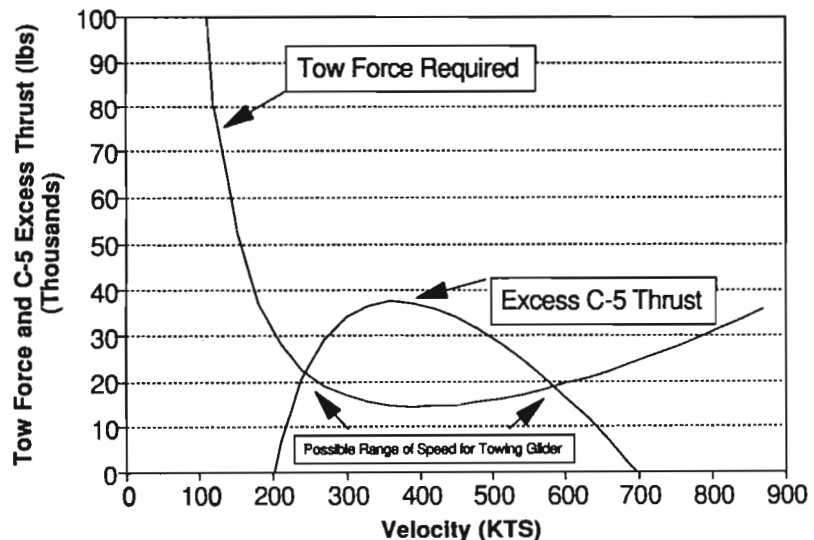
And, just because our paratroopers are great warriors, that’s no excuse for employing them to fight tanks without their own main battle tanks, especially if we could provide them.

The currently correct solution lies in “light armor.”

Bradley Fighting Vehicles and Armored Gun Systems, using superior cunning, concentrated fires, and careful tactics, can defeat main battle tanks, so the story goes.

History says, “not so.”

Tow Force and C-5 Excess Thrust @ 25,000 ft



"The point is, while Bradleys and the AGS have useful, "tank-destroyer" places in our war-fighting mix, they are not tanks, and history indicates they cannot fight tanks on equal terms. They are also at a disadvantage."

The British army discovered the folly of such halfway measures during its March 1945 Rhine crossing.¹ Thinking to defeat German tanks with "superior cunning, concentrated fires, and careful tactics," the 6th Airborne Division flew in several U.S.-built M22 Locust light tanks aboard Hamilcar gliders.

Admittedly, the Locust was a 1941 design and obsolete by 1945; but it qualifies as a light tank going against heavy armor. Its thin skin warded off only small-arms fire, and its 37-mm gun and .30-caliber machine gun hardly dented German tanks.

Predictably, it lost a lot more tank fights than it won.

The point is, while Bradleys and the AGS have useful, "tank-destroyer" places in our war-fighting mix, they are not tanks, and history indicates they cannot fight tanks on equal terms. They are also at a disadvantage.

So, experience shows the "light armor" solution is no solution at all. If we try to fight real tanks with "almost tanks," we're likely to have the same problems and suffer needless casualties.

No, we need main battle tanks to fight real tanks.

Hence, the M1 Abrams continues to be the best weapon to kill enemy tanks, as well as just about anything else on the ground. Main battle tanks offer devastating long-range firepower, all-weather mobility, and protection; and they do so in ways no other weapons system can.

So logically, we must give our paratroopers main battle tanks, and there's just one way to do that — jet-towed

gliders much like the one our West Point engineers designed.

"There are some very good reasons to explore gliders again," Kopsler

said. "Gliders could perform better than parachutes. They're more efficient for heavy loads because parachutes scatter forces over huge areas; and modern technology lets us overcome the World War II problems of structure, control, and nighttime navigation."

"In fact, global positioning systems give us the ability to pinpoint a spot anyplace on earth, set up a software-only, instrument-landing system for that point, and put down the glider right where we want it," Nygren agreed. "A computer in the cockpit could pick release points, glide speeds and angles, headings, and everything else. From an engineer's point of view, the system is elegant and the software is simple."

And jet engines mean tank-carrying gliders could fly.

"The big problem is initial acceleration," Kopsler said. "The C-5 has plenty of power to tow this glider at approximately its best-range airspeed. We're eager to get good data on C-141s and C-17s, too; either plane probably could do it with the same load, and certainly could with only one tank, or maybe with one tank and a mechanized-artillery piece or a recovery vehicle. But takeoff is a problem we'll have to research more."

So flying isn't the problem. Takeoff is.

"I think the best way to solve it will be some kind of JATO (Jet Assisted Takeoff), maybe with disposable

Mission Specifications for the M1A1 Glider Delivery System

Payload: Two combat-loaded M1A1 Abrams tanks including crews

Crew: Two pilots with safety and survival equipment

Range: 60 nautical miles from release point at 25,000 feet above ground level

Altitude: 25,000 feet (Corresponding to the C-5's cruise altitude)

In-tow Cruise Speed: 450 knots at 25,000 feet

Powerplant: Auxiliary-power units

Pressurization: 5,000 ft. cabin at 30,000 ft.

Certification Base: Federal Aviation Regulation 25 and Military Specifications

rockets you can jettison after you get to cruise altitude," Nygren said.

That's precisely the solution the Germans used. They blasted their biggest glider, the Gigant, into the sky with rockets behind a monstrous tow plane, the Heinkel 111Z. The Zwilling was two He 111 bombers joined at the wing with a fifth engine added at the junction. Of course the Zwilling itself was clumsy in the air, and the combination was very slow.²

"Well, speed won't be a problem with jets," Nygren said. "Even with the increased load of a glider, they'll still fly at or near best-range airspeeds. Increased power settings will degrade their range, but air-to-air refueling extends range as far as we need it."

One big problem with World War II glider operations was the rapid obstruction of landing zones. Once a glider landed on skids, it stayed put, usually directly in the approach path of following gliders. If the glider landed on tactical wheels, soldiers inside could shove it out of the way, but the wheels extended the landing run, endangering the glider. The only way pilots could brake was to shove the control wheel forward and drag the nose in the dirt.

"This glider will weigh between 25 and 35 tons and carry a 140-ton load," Kopsler said. "Though the belly needs to be tough enough for a wheels-up landing, we want to land on the gear if at all possible, and we've made that

the best option in most cases. I've designed the glider to land at 75 knots airspeed, which means wheels-down landings will require about a 2,130-foot roll on a hard-surface runway and less on soft surfaces. Historically, wheels-up landings require anywhere from $\frac{1}{5}$ to $\frac{1}{3}$ that distance. If we land wheels-down, one of the M1s aboard can hook up to the glider and tow it off the landing zone. If we land wheels-up, that technique still should work. Besides, computers can gener-

Author's Note

The author would like to thank Colonel Kip P. Nygren and Second Lieutenant George J. Kopser for their help in preparing this article.

Colonel Nygren is a graduate of the U.S. Military Academy. He holds two M.S. degrees, one in Aeronautics and Astronautics and one in Industrial Engineering, both from Stanford University, and a Ph.D. in Aerospace Engineering from Georgia Tech. He has been on the USMA faculty more than nine years and currently is a Tenured Associate Professor there in the Department of Civil and Mechanical Engineering.

Second Lieutenant Kopser received a B.S. in Aerospace Engineering and his Armor commission from the U.S. Military Academy in 1993. Upon graduation from the Armor Officer Basic Course, he will be assigned to the 3d ACR at Fort Bliss, Texas.

ate precision landing points anywhere on earth. We can land these gliders in formation a couple hundred meters apart, and they won't get in each others' way."

One option is to extend the landing gear only slightly beneath the glider. Twelve inches ground clearance is more than enough for takeoff and landing on prepared surfaces and provides wheels for tow-away operations on tactical surfaces.

Are recovery operations a problem?

"Nope, they're a challenge, and there are plenty of options to examine," Nygren said. "Joe's designed this glider for easy disassembly. You can stow the wings inside the glider, tow the glider to an airfield, and insert the whole thing inside a C-5 for redeployment.

"Or, you could do an airborne snatch. The glider will weigh $\frac{1}{6}$ its loaded weight after it discharges its tanks. It could carry in a couple of JATO rockets. The crew could attach them and blast out of the landing zone as a recovery jet approaches, possibly the very same airplane that delivered the glider in the first place. Remember, those rockets were powerful enough to propel the glider and two tanks into the air from a runway. They'll be powerful enough to lift an empty glider from a tactical landing zone. Once airborne, the glider deploys a towing cable, and the recovery jet hooks up for a normal tow. For training, say at Sicily Drop Zone on Fort Bragg, the rockets might take the glider high enough for self recovery to Pope Air Force Base."

What if the Air Force says it doesn't have a suitable towing aircraft?

"That's just not so," Kopser said. "The C-5 definitely can tow this glider. I expect my analysis will show the C-141 can, and the C-17 will be able to also."

And Nygren agrees.

"In World War II, we towed gliders with just about anything powerful enough to do the job. DC-3s towed some pretty heavy loads, and even P-38 Lightning fighters towed Waco gliders on occasion."

These two aerospace engineers have completed a preliminary design.

"Joe's purpose was to determine if this tank-carrying glider can work," Nygren said. "The bottom line is, it can. I think the need is there; and if it is, we should get to work on this glider."

Notes

¹Fitzsimons, Bernard (ed.), *The Illustrated Encyclopedia of 20th Century Weapons and Warfare*, V. 16, Columbia House, New York, 1978, pp. 1757-1760.

²Mrazek, James B., *The Glider War*, St. Martin's Press, New York, 1975, pp. 35-36.

Major E. C. Parrish III is a Distinguished Military Graduate of Pennsylvania State University and holds an M.A. in journalism from the University of Missouri-Columbia. His 18 years of military service include combat in Grenada and Iraq, company command in the 160th Special Operations Aviation Regiment (Airborne), and assignment to the 1st Battalion (Ranger), 75th Infantry. A graduate of the Command and General Staff College and Armor Officer Advanced Course, he is assigned to HQ, U.S. Army Recruiting Command, Fort Knox, Ky. Additionally, has authored seven magazine articles supporting the President's 50th Anniversary of WWII Commemorative Committee. He is a previous contributor to *ARMOR*.

LETTERS (Continued from Page 3)

task that eats up the most time in the field, and no matter how you cut it, it just boils down to pure manual labor. The driver may be alerted that his starter is going to die on him and has only five good starts left in it, and that's great. But that's an organizational-level maintenance problem anyway. It also cuts into his time because he needs to supervise, and possibly assist, the mechanics that replace his starter! With only two men on the tank, more time is going to be needed to accomplish the same amount of maintenance that is done now. Prognostic and diagnostic modules do not eliminate work, they merely identify it in advance. It then becomes the job of the executive officer and maintenance sergeant to prioritize work and assign their mechanics accordingly. There is a great difference between identifying work and eliminating it.

Other technological advances are also incorporated into the two-man tank, such as the automated acquisition and engagement system. I should mention first that both the driver and the tank commander are able to fire the tank's weapon systems and drive. But who is going to engage targets while on the move? The commander must maintain his battlefield awareness, navigate, and report to higher on the radio. The driver is obviously quite busy himself. So who fires the tank? An automated acquisition and engagement system cannot be relied on to acquire and kill targets. That is an invitation for fratricide like we have never seen. If the tank is not capable of firing on the move, does it support current doctrine?

Let's take a look at some basic assembly area operations, for example, security. We are all familiar with dismounting our loaders to form local and NBC security, while a crewman remains in the TC's hatch manning the .50 cal. machine gun against air attack. Who is left on the tank to do the necessary maintenance, and when does any type of crew rest occur? The answer is an automated air, ground, and NBC security system! This system somehow monitors for any type of threat and alerts the crew members, who are either working on their tank and/or weapons, eating, or resting. How exactly does this system work? How much work does it take to set it up and maintain? Most importantly, how accurate and effective is it? Unfortunately, these questions have not yet been answered.

Radio watch is another function that must be done at all times without fail. It frequently keeps a crewmember tied up while he could be doing something else. Cordless CVC helmets are a great idea brought out by this study. This enables the crewman to work on his track and monitor the radio at the same time. The new Intervehic-

le Information System (IVIS) being fielded on the M1A2 also helps during radio watch by incorporating a type of alarm that sounds, alerting crews of incoming calls for their particular tank.

Automated refuel and rearm systems on the two-man tank are also being mentioned as examples of saved time and less work for the crew. Refueling is pretty fast when done in a good Refuel on the Move (ROM) format today, and without concrete examples, I'm not too sure how that can be significantly speeded up, or made much easier than it already is. But how is loading a full basic load of main gun ammunition going to become automated? It has been suggested that the "honeycomb" of main gun ammunition can come as one complete unit, and the tank can be equipped with a crane or winch in order to set the ammunition into its compartment. While this may save some time, it will require increased supervision, and the end product may not be much different than current practice. There will also be a need for the capability of receiving partial issue of ammunition, and in those cases, it must be reloaded the old-fashioned way and take just as much time.

A two-man tank with both crewmen sitting abreast in the hull, as has been proposed sets the stage for another problem. How will they maintain a 360-degree field of vision? The solution is a series of standard vision blocks in the front, but on the sides and in the rear, a series of camera sensors are mounted and these views are seen on television screens on the crewmen's instrument panel. This is an interesting and innovative concept, but what happens when these sensors become covered with mud or shot off by artillery or small arms?

Manning the two-man tank becomes another problem. Should there be two crews for each tank that rotate when one is tired and needs to rest? Or should each tank carry an extra crewman who rests in the back until he is needed to rotate with one of the primary crewmen? What happens when men are needed for details? Many times today, we have problems fielding enough personnel to accomplish a task due to details, and we have four men to start out with. Imagine the problems inherent in a unit equipped with two-man tanks! As soon as any personnel are absent, the workload would increase by a much larger proportion, and the time necessary to complete the work would also increase, not to mention the quality of work being done when significantly undermanned and holding to a demanding schedule.

There are a number of problems with the two-man tank which must be corrected. Even while taking into account the auto-

mated systems, which may or may not work, the current design does not enable the crew to accomplish all of their necessary tasks and still get a reasonable amount of rest. The tank must be able to maintain 360-degree vision under any circumstances. Most importantly, the tank must be capable of mission accomplishments in a fully degraded mode.

In conclusion, some very good ideas in tank technology were brought out by this study, but the model as it stands is unreasonable. Tactics and doctrine should not change to fit our current technology, but our technology should complement our tactics and doctrine. The two-man tank would require us to change both tactics and doctrine, and I do not believe that is an option worth considering. Further, if a tank cannot complete its mission in a fully degraded mode, it is not worth building. In combat, degraded mode may be the norm, and this two-man tank will be a burden instead of a valuable asset.

MATTHEW KRISTOFF
1LT(P), AR
Ft. Knox, Ky.

The ATOC: Solution to the Bn/TF Continuous C³ Dilemma

Dear Sir:

Redundancy — a term synonymous with waste and precious resources squandered — may well be viewed as unnecessary from the purely budget-minded perspective. To the maneuver commander on the ground, nothing can be more precious than his ability to communicate and influence the battle. Losing his Tactical Operations Center (TOC) at a critical time deprives the commander of effective lateral and higher communications and severely limits his ability to control company/teams. Most importantly, perhaps, the task force commander is no longer able to bring combat multipliers to bear — thus making any confrontation merely a company-level battle. Having recourse to an alternate TOC, staffed and equipped to handle task force combat operations, provides an alternative to the severe degradation of effectiveness suffered by a task force that loses its TOC.

Current doctrine gives the "alternate TOC" mission to the Battalion Support Operations Center (BSOC or ALOC). If the TOC is destroyed, the BSOC is to continue its vital personnel, medical, ammunition, rations, fuel, and maintenance support coordination for the battalion and at the same time take on the aspects of combat operations that the TOC normally attends to.

This is broken. Even the best units could not claim this works well even for one mission, let alone several days or longer. The BSOC simply is not equipped or staffed for handling even the routine functions of both logistics and operations. By blindly accepting this TOC/BSOC relationship, we are either assuming the TOC will never be destroyed or are willing to accept the reduced effectiveness that would result as the task force leadership attempts to regain the C³ lost when the TOC is destroyed.

The answer to this problem is to create an Alternate Tactical Operations Center (ATOC) staffed and equipped to handle basic TOC functions with a minimum of transition time. The ATOC provides the necessary redundancy for successful task-force operations. It can also serve several important functions when the TOC is fully operational: retrans for longer range FM communications; planning for the next battle (24-hours out); management of the task-force operations/intelligence (O/I) net; jump-TOC while the TOC moves; and orders group meeting point, to name a few. Selling redundancy in C³ as a concept for implementation at the battalion/task force level requires two things: establishing the need for redundancy and addressing the cost (in terms of manpower and budget) such redundancy entails. Whatever the solution, it must provide adequate near-term C³ for the battalion/task force as the TOC regroups, while not overburdening an already stretched MTOE.

I propose making the ATOC a highly mobile entity streamlined for basic TOC functions. It would use the versatile M998 as the basic vehicle, both to provide the necessary mobility and reduce the cost involved with M577s. I would prefer using the HMMWV ambulance as the platform of choice. The layout of an ambulance can be easily modified to accommodate VRC radios or an MSRT, map boards, and status boards as necessary. This approach may entail more vulnerability to artillery and small-caliber munitions; I argue that it is more than made up for by a greater capability to rapidly displace and reduce cost. The ATOC depends on its mobility and low signature for security. After all, the MTOE change to HMMWV scout platoons is a result of similar reasoning. The cost of this type of approach (in terms of equipment) should be minimal due to low annual maintenance and operating costs and the availability of excess HMMWVs associated with the Army's current drawdown.

I propose a new equipment subparagraph in the battalion S3 MTOE for the ATOC as follows:

- 1 M998 HMMWV (cargo carrier)
- 2 HMMWV Ambulances (modified with crank-up antenna poles)
- 2 VRC-47 Radios (speech secure)
(4-net capable: TF Cmd, TF A/L, TF O/I, Bde Cmd)
- 1 MSRT (1-net capable: Bde Cmd)
- 2 OE-254 Antennae (antenna heads fit crank-up poles while moving)
- 1 KYK-13
- 3 Camouflage sets
- 6 M16A2 Rifles
- 1 Portable generator
- 2 PVS-7 NODs
- 2 Binoculars

Once more, I hardly think the costs associated with adding this equipment to the battalion's MTOE outweigh the benefit to sustained combat operations that an ATOC-equipped battalion would enjoy.

Personnel costs are, perhaps a more significant factor. Clearly ATOC personnel cannot come out of an already strapped battalion MTOE. The battalion MTOE needs to be modified to include ATOC manning subordinate to the battalion S3. I am sure any battalion S3 could find something for this small section to occupy itself within a garrison environment. Who knows, this might even result in a few tankers moving back to the tank companies where they belong. I propose a minimum manning level of:

#	Rank	MOS	Title
1	O-2	12A	Asst S3, ATOC OIC
1	E-7	19K/D	S3 Opns NCO, ATOC, NCOIC
1	E-5	19K/D	S3 Opns NCO
1	E-5		S2 Intel NCO
1	E-4	19K/D	S3 HMMWV Driver/RTO
1	E-3	19K/D	S3 HMMWV Driver/RTO

This level of manning allows the implementation of a sleep plan (three personnel asleep/three awake at all times) while operations are monitored and the ATOC displaces with the tactical situation. The ATOC OIC and NCOIC should be specifically picked for their ability to monitor the battle, understand the commander's intent, and communicate effectively with the company/team commanders. I would choose a first lieutenant who had already been a platoon leader and company XO or scout, mortar, or support platoon leader. I would choose a sergeant first class who had already finished a successful platoon sergeant tour. The experience and capabilities of these two individuals will make or break the ATOC's ability to fight the battle.

Every exercise (NTC, CMTC, etc.) I have been involved with has glossed over the very real danger facing the TOC (not to mention the orders group that might well be assembled therein) in combat operations. The FM, noise, and visual signature can be reduced but not eliminated; real security is virtually impossible without tying up

maneuver units. To assume that the TOC will be able to provide continuous battle management is unrealistic. To make no real provision for the TOC's demise or degradation is inexcusable.

CPT MARK G. EDGREN
Senior ROTC IG
University of Dayton
Dayton, Ohio

Request for Data

Dear Sir:

I am asking for assistance from the readers of *ARMOR*. I am working on a 1/35th scale plastic model of the T80 VISMOD, of the type used by the OPFOR at the NTC. I am almost finished with the kit with the exception of the left side and rear of the turret. I lack the details to finish these areas. If anyone has photos, drawings, etc. showing these areas, I would appreciate it if I could acquire them. Also, any drawings, etc. showing the MILES apparatus installed would be appreciated as well. I would make a great effort to return any such material at the sender's request. Any assistance would be greatly appreciated. Thank you.

SSG CRAIG C. MOSHER
HHC, Training Group
Ft. Knox, Ky.

Calling All U.S. Tank Crews Who Were in Germany in 1945

Dear Sir:

I am a British military historian seeking personal accounts and personal stories from U.S. Army tank crews who were fighting in Germany in the last five months of the war, maybe at Trier, on the Rhine crossing, or at the Remagen bridge, or anywhere in Germany from Jan. 1, 1945, to May 8th-VE Day 1945. I would like to hear from tankers who were there and have a story to tell, for my new book *ARMAGEDDON 1945, The Conquest of Germany*. Responders should write with their company, regiment and divisional details, age and rank in 1945, and memories of that time to the author at the address below.

ROBIN NEILLANDS
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Great Britain



An "instant firebase" being born.

with the "Bloop Tube." They were good for recon by fire too, and more than one RPG artist got sent to the promised land by a 40mm. There's also a tear gas round for the weapon. It's useful in LIC, as it's nonlethal. After all, the object is to separate the sheep from the wolves, not depopulate the area.

Armor in LIC operates in a unique environment, in that the mission is as much hearts and minds as lethal combat, and you have to be able to deliver graduated nastiness. To that end, we mounted EE-8 tear gas projectors on our searchlights. This allowed the package of 24 little teargas bomblets to be elevated and traversed for crowd control. Unfortunately, that particular weapon is chain fire, you can't just use part of them. Once the cord is pulled, they're all gone. Another "weapon" that's not often thought of is the muzzle blast of the main gun. Put the muzzle next to any building containing stubborn hostiles and fire, (check where it's pointed) and the argument's over. You don't have to kill to win arguments, just be creative. The turret hydraulics, for instance, are powerful enough to simply knock mud and bamboo walls out of the way with a few swings of the gun tube (this may affect your sight alignment). LIC is, by definition, close combat.

Extended running in harsh climates and over rough terrain will inevitably wear out many items which would normally last much longer, so you'll wind up carrying spares for the electrical, hydraulic and mechanical systems, as well as ordnance spares. The "bolt box" will get expanded to a sophisticated inventory of spare parts. This is going to require the knowledge of just how to use those expensive third echelon parts, and that means that either you find a place to carry extra people, or cross train your crews. This is another argument for the Bradley or a M113 based force... there's simply more room aboard. The vehicle could be looked at as a tank with cargo space, like a small Merkava. You can cross train your people and have specialists on board.

Any crew with over a thousand miles behind it doesn't really need a track mechanic, so your platoon needs only three specialists, commo, engine, and turret mechanics. So, pull three men out of the crews and send them off to school. When they come back each man will add a selected list of parts to his vehicle and become the resident specialist. We also carried an oversupply of demolitions gear too, and there was always somebody with the skill to use it.

Medics too, are a necessity. Here there should be cross training in every crew for several reasons. First, of course, to take care of damaged tankers. With the advent of the SA-7, we may have seen the last of instant medevac. Second, and really very important, is that in all Third World populations, a U.S. Army medic is seen as a doctor. Drive into a village, run off the political fanatics and outright bandits, set up a decent clinic, and you OWN the place. They'll tell you where the guerrillas are and wash your fatigues just to keep the doctor around. Our normal MO was to drop the medics off in a Montagnard village to work on local health problems while the MI people asked questions. Then we would run uphill away and sit there and exude menace...or give rides to the kids, whichever seemed best. Hearts and minds begins with the kids, and many times, we would get good intelligence for the cost of a little diesel fuel as the kids pointed out the trails the VC had been using.

Out in the boonies with the locals, pioneer work takes on a whole new meaning. When you have to construct temporary bases, build bridges, and clear fields of fire, an axe and shovel are not enough. Some special engineer items, such as chainsaws and earth augers should be added to the basic load, along with basic carpenter tools, concertina wire, and so on. The percentage of dozer-equipped vehicles should also be increased and, now that the engineers have their new combat tractor, it might be possible to get some of those CEVs assigned to armor. They're more than half tank retriever already.

The larger the unit, the longer it can stay out, but the more gear it must carry, and the more flexible it must be. In case of a platoon, that includes some things that are normally company or battalion property. Engine slings, for instance, allow engine removal by a five-ton boom truck or even a civilian wrecker. When you're up against it, use what works. We even carried barrel pumps because it

was possible to buy fuel from the locals. You had to have a filter on the pump of course.

We also bought food off the local economy to extend issue rations, which consisted of C-Rations and the then-new freeze dried Lurp rations. We kept a 20-lb bag of rice and fresh fruit and eggs as menu extenders, and usually had a spice rack behind the radios. Battalion or company mess began to issue some rations, such as bread and canned meat, directly to the platoons and let the troops do the cooking. Out of any platoon, there is always one good cook.

Food of any sort, and personal hygiene, requires potable water. Sometimes, though, that meant washing in the streams with the natives and the buffalo, in order to conserve the safe, engineer-supplied water. With modern technology, that shouldn't be necessary. There are plenty of good, high

capacity water filters on the market, and one should be part of every tank's equipment. They are expensive, but not as costly as a man down with amoebic dysentery or some other tropical blessing.

The farther you get from home base, the more independent you must be, and the existing TO&E needs some radical adjusting for long range ops. Some experiments should be done now at the NTC or some similar location. A good start would be to marry up a tank company, a mech infantry company, an engineer platoon, and maybe a Special Forces "A" team, put a major and a captain in charge of it, and see what shakes out of the combination. It might be a small combined arms unit that's never existed before, something between the company and the battalion. It ought to be tried now, before we have to do it by OJT... again.

Ralph Zumbro has served as an NCO in each of the combat arms, including combat service in the RVN. He commanded tanks in Vietnam, USAREUR, and CONUS, and served as a gunnery and demolitions instructor. With a degree in marine propulsion technology, he has worked as a salvage diver, yacht captain, and college vocational-technical instructor. Now a writer, his works include "Tank Sergeant," his memoirs of service in Vietnam; and "Jungletracks" and "Puma Force," co-authored with his former XO, James Walker. Currently, he's working on two military science fiction books which feature armored action.



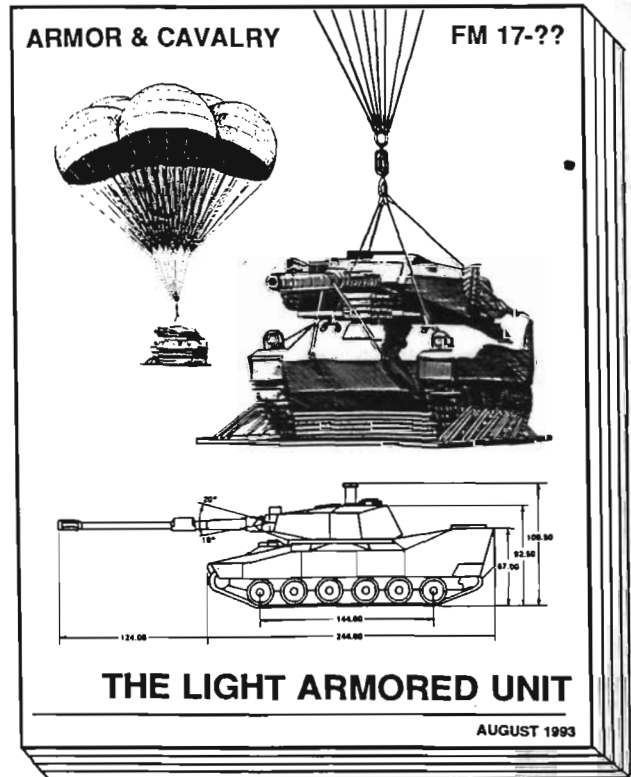
Jungle patrol - Without infantry, this is NOT the way to do it!

The Armored Gun System is Coming... ...Now, YOU write the book!

The Armored Gun System is scheduled for fielding in the 1997 time frame, and work has begun on the field manuals and doctrinal publications that will support this new weapon system.

In addition to replacing the M551 Sheridans now in use by the 82nd Airborne Division's 3-73 Armor, current plans call for the new light cavalry regiment, the 2d ACR, to be equipped with this system, and possibly also two additional separate armored battalions.

In a future issue of ARMOR, we'll be covering the current development of light armor doctrine, based on draft FMs and interviews with some of the doctrine writers working on these publications. They've indicated that any input from the Armor Force will be appreciated.



Here's a chance to be heard. We're opening the forum in the January-February issue.

The AGS hardware was covered in the July-August 1992 issue of ARMOR. Now it's time to develop the software.

- What kind of missions should the AGS perform? And what current tank missions should be ruled out?
- What problems do you foresee in the employment of the AGS?
- How does infantry take advantage of the AGS's mobility without sacrificing its employment in mass?
- How might the AGS have played in Grenada, Panama, DESERT STORM?
- After the AGS has been deployed rapidly to a contingency area, does it have a later role after the battle is handed off to heavy forces?
- Have you been in a situation where the AGS would have made a difference?
- How should armor and light infantry forces work together? Is there room for improvement in how this type of operation is conducted now?
- Is there a historical parallel, for example the German Sturmgeschutz of WWII?