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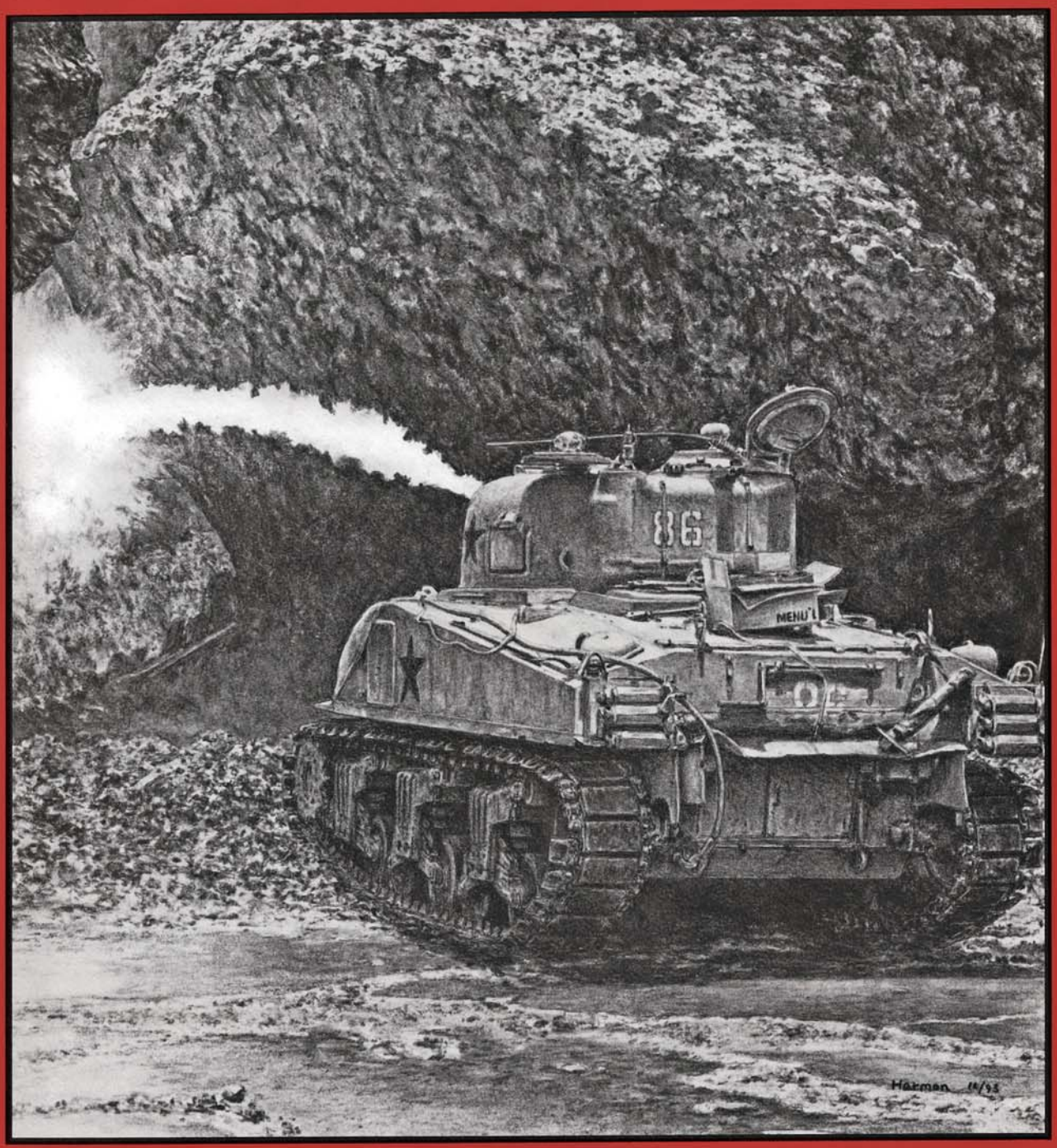

Flamethrower Tanks on Okinawa

PB 17-94-1

January-February 1994

I am struggling to find a historical precedent that will help me understand where our Army and our nation is headed. Like many of you, I am uncertain about the future, thus, as people often do in unfamiliar situations, I seek some known quantity — some solid ground amid the erosion of the world as I know it — from where I can get my bearings. Is there a known terrain feature on the 1:50,000 map of our profession — a place we've been before? I need some high ground where I can stand up, look around, let out a deep breath, and say to myself, "I was here once. Now I know where I'm headed." But right now, I hate that panicky feeling, that knot I get in my stomach, when I realize I'm disoriented.

In previous times of uncertainty, I, like many of you, have turned to history for the answer. It's always been a stalwart for me. I could always find some other time — some other epoch of our martial development — that I could compare to the present. For example, during a period of angst when the "drawdown," "chain teaching," or "right-sizing" (my personal favorite) began, I read about the post-Civil War Army and how it was raked and gutted with the coming of peace. I felt a bit better realizing we had survived to successfully wage the Indian Wars (though not without considerable relearning of previous lessons), and to pursue and overwhelm Pancho Villa. And yet, in a world where powerful "smart" weapons can be purchased by any country with a fat checkbook, like so many ugly clock-lamps amid some kind of mad, international flea market, I still have difficulty finding any peace about the future. How can the world say, "Peace, peace; when there is no peace?"

So I turn to the post-World War I record for additional solace. Again I find we survived the budget axe after winning the "war to end all wars." Of course, rearming and refitting for the next one cost us plenty, and again we relearned our lessons; but we did it, partly because we'd been there before. The aftermath of Korea and Vietnam can also teach us valuable lessons about the profession of arms. Still, that period of time cannot equal the present, when countries talk of nuclear weapons stockpiles as "material wealth" and actually suggest selling them for some fast cash. Maybe I'm missing something, but it sure seems to me that nations are in greater turmoil and greater danger than ever.

As much as I'd like to tell you where you can find a precedent for our present situation, I can't. I've yet to discover one. Oh, yes, there are some historical patterns that approach our current disposition, e.g., various RIFs, program cutbacks, personnel realignments, etc., but there are no parallels. Nothing... nothing equals the challenge we now face in the New World Order. When soldiers aren't sure if they're going to be selling shoes next year, or qualifying on Tank Table VIII, it's hard to see past the next LES. And yet, we must. We must look ahead and remain vigilant and true to our mission. We cannot be lullabied by the deceptive flute of peace, for indeed, there is none — only "wars and rumors of war." And while it is proper and beneficial to search our history for a sense of direction and a familiar landmark, what do we do when we can't find one?

It's all right to admit you're disoriented. It's not okay to do nothing about it. We can't close the hatch, turn on the heater, prop up our feet, and hope the blast wave will miss us. We can't park our vehicle, break out the MREs, and wait for someone to find us and lead us back to the TOC. We must dust off the imperfect map we've got, immerse ourselves in our profession, concentrate on being the best tankers and cavalrymen we're capable of being, and drive on in search of the next objective. But that feeling, that nagging uncertainty, is likely to hang around for a long, long time.

— J.D. Brewer

By Order of the Secretary of the Army:

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General, United States Army
Chief of Staff

Official:

MILTON H. HAMILTON
Administrative Assistant to the
Secretary of the Army

05730

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LETTERS

Brigade Cavalry Troop Would Cover Void in Brigade Deep Ops

Dear Sir:

"Brigade Deep Operations: Task Organizing for Victory." by CPT McCurry and 1LT Phillips (*ARMOR*, September-October 1993) brings to our attention a problem that has existed for some time. Heavy brigades lack an organic scout capability to execute the brigade R&S plan. Currently, there exists a void in the brigade area of deep operations. However, the reserve BN/TF scouts are not the solution.

Using their arguments, I propose a solution to this ongoing problem. Clearly, a scout platoon has neither the training nor the resources to effectively orchestrate the brigade R&S plan. GSR, Engineer, Aviation and other slice assets' success depends on prior integration and training with the scout platoons. It must be remembered that each of the above have their own METL to base their training schedules on. Coordinating a synchronized training schedule would fall in the wake of other divisional, brigade, and battalion priorities.

It is obvious that each of the major maneuver commands have a "scout" element at their disposal. A corps commander has an armored cavalry regiment. The divisional commander uses his divisional cavalry squadron. A battalion commander deploys his scout platoon, but the brigade commander has no organic reconnaissance unit. The solution lies in a brigade cavalry troop.

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FM 100-5 defines brigades as having two or more battalion-size units. Furthermore, it states that the divisional commander establishes the organizations as frequently as necessary. Regardless of the brigade composition, the commander would have a steady R&S platform that would allow him to put "eyes and ears" on the ground, in the brigade area of deep operations.

The troop would be organized with three scout platoons consisting of three M1A1s and five M3A2s per platoon. In addition, there would be an organic mortar platoon. The fire support section would include the troop FIST-V, COLT team, and an ALO team. This increase would allow the fire support/CAS/Army Aviation effort to be more closely integrated with the troop. Also, the troop would have its own maintenance, mess, supply, and medic sections that would allow the troop to operate forward in the brigade deep area of operations. Last, the commander and XO would have M3 CFVs. The XO's M3 would be modified to accomplish his key role as the NCS of the troop. Let's face it, the M577 has outlived its usefulness and should be honorably retired from service.

Once divisional slice elements had been assigned under brigade control, the brigade TAC would then serve as the coordination point. The troop commander would have the training and understanding of brigade deep operations (i.e. AOAC). The troop would provide the proper command and control and support to successfully integrate GSR, Engineer, Aviation and other divisional slices into its METL training schedule prior to and during field exercises and other deployments. The commander and his staff could plan effective training without overburdening the subordinate battalion scout platoons.

The brigade cavalry troop would be a tremendous asset for National Guard and Reserve heavy brigades. Unlike their Active Duty counterparts, most Reserve Component divisions are spread across vast distances. The brigade cavalry troop would bring a new dimension to the brigade OPORD process. Coordination and training of the troop with divisional assets could be accomplished. The troop would train to execute the brigade R&S mission during annual training.

In conclusion, task organizing echoes the lessons of the Korean War. Often units were thrown together, at the last minute, with little or no familiarity with each other. The results were often disastrous. The brigade cavalry troop is the answer to covering the "no mans land" that currently exists in the brigade's deep area of operation.

MELVIN WILSON
1LT, 2/172 Armor Battalion
Rutland, Vt.

Dual MOS Qualification Valuable for AGS Soldiers

Dear Sir:

In response to the September-October issue of *ARMOR*, I think there are plenty of situations where the AGS can be deployed within reason. One of the main questions to be answered along with tactical doctrine will be training doctrine. Will units that are AGS equipped have soldiers that are 19/Delta or Kilo, or will they receive OJT, which the 3-73 currently uses? Also, who will comprise the initial training cadre for the initial roll-out? Should we develop a new MOS for the AGS?

In my opinion, it seems the Armor Force is calling for the AGS to accomplish both the 19/Delta and 19/Kilo missions. It would be valuable for AGS soldiers to be dual-MOS qualified and for the leaders to attend SPLC. Due to the fact that the AGS will have to operate in the LIC and HIC environments, AGS soldiers should be able to use the knowledge of both MOSs to improve their survivability and lethality.

As someone who may one day be called upon to work with or support the AGS, let's make sure we look at all the angles.

SAMUEL F. CHERRY
1LT, Armor, NCARNG
Raleigh, N.C.

Isn't the AGS a Tank Destroyer?

Dear Sir:

The September-October 1993 back cover asked some intriguing questions about the future for the Armored Gun System. I have followed this system with anticipation for many years, and I'm excited that its finally here (almost).

One question posed was "What kind of missions should the AGS perform?" A suggestion is to look at the old tank destroyer doctrine from World War II. After all, isn't that what this vehicle really is? According to Webster's Dictionary, a tank destroyer is a highly mobile, lightly armored tracked vehicle with a comparatively large gun. I think that's what we have here. My memory recalls that the problem with tank destroyers in WWII was not the weapon or the tactics. The problem was the lack of skillful employment by commanders who thought the TDs were tanks. Maybe we can learn some things from the past that we can apply to the future.

I think that a major problem that the AGS will have in the 2d ACR (L) will be its employment within the normal regimental cavalry troop TOE. How do we put scouts in HMMWVs riding with the AGS? I know that the Future Scout Vehicle (FSV) is on the drawing boards, but, in reality, it will be at least 8-10 years before we see it. An idea may be to put the scouts in an LAV-25 or an M113A3 until the FSV is fielded.

Another question is, who will man this vehicle? Will it be 19Ks with an additional skill identifier (ASI), a tanker with a new MOS, or a scout with another (ASI) to master? Personally, I would like to see a new MOS that is another tanker field.

Finally, how do I get on the team? Seems to me this is going to be a very exciting place over the next few years and I for one don't want to miss the boat. Meet you on the high ground.

RAYMOND F. CHANDLER III
SFC, MSARNG
Master Gunner, Resident Tng Det
155th Separate Armored Bde (Heavy)
Tupelo, Miss.

We Must Learn From the Past

Dear Sir:

I refer to your comments on the Armored Gun System outlined on the back cover of the September-October 1993 issue of *ARMOR*. Today, there are several different AGSs in the world's armies. One need only refer to *Jane's* to find them. In 1980, while working as a consultant with the Armored Combat Vehicle Technology Program, I was asked to do a study on armored protected gun systems used by different armies. Several things became clear. In most armies at the time, strategic mobility was not an important criteria, nor was a tank-killing capability, but a show of force mission profile was. This did not set too well with our combat developments people. Whatever armored protected gun system the U.S. might develop must be strategi-

cally deployable, able to kill tanks, and attack if necessary. One old soldier called the requirement a light tank with a big gun. In regards to a show of force, I think that when Argentina started rattling swords about taking the Falklands, if the British had sent an airborne brigade with Scorpions to the Falklands, Argentina may have backed off. Maybe not; in 1993, a show of force did not work out very well around the world.

The U.S. Army's Armored Force has had a historical problem with light tanks. The M5 was undergunned and did not survive well in North Africa or the Italian campaign. The M24 was undergunned and did not survive well in Korea. I think the M41 would have, but it was not issued there until 1953. In 1956, when the Russian T54 showed up during the Budapest Uprising, the M41 was soon removed from U.S. cavalry units in Germany because it was thought too underarmored and undergunned. (The irony here is that 15 years later, the 76mm M41s with South Vietnamese cavalry units made scrap of six T54s and 16 PT76s at the battle of Lam Son 719. Not one M41 was lost.)

Light armored fighting vehicles got bad press over the years, especially in the '70s because of the M551. The airborne people insisted in the late '50s they needed an assault vehicle about the size of a light tank. It had to be able to be air dropped, LAPESed, float, and mount a long-range standoff weapons system. This turned out to be a 152-mm missile-gun arrangement. Over the years, the Armored Recon Airborne Assault Vehicle evolved into the M551. It was a long and difficult development program with a lot of name calling.

In 1966, while attending C&GS, I wrote a paper on what I called "The Armobility Concept." I proposed light armor combined arms units that could be airlifted into troubled areas. The concept was later published in *ARMOR Magazine* titled "Showdown at Echo Junction." My peers broke into two schools; those that endorsed the concept and those that thought it was a good way to get waxed.

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EDITOR *(Name and Complete Mailing Address)*

Major James D. Brewer, USAARMC, ATTN: ATZK-PTD, Ft. Knox, KY 40121-5210

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James D. Brewer

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Back to the M551. By 1968, it was in production, but the Army did not want to issue it because of numerous deficiencies that needed to be corrected. In July 1968, I was assigned to J-3 MACV in Saigon. General Abrams was intrigued with the M551 and wanted to know if it would be introduced into the theater. I was told to conduct a study. Officers that I knew who were familiar with the entire program were brought over TDY from the States. We recommended that a small number be brought in for test. Certain modifications were needed and we thought the Shillelagh missile system should stay at home. It was thought the 409 multipurpose round would be an excellent bunker buster and the canister round would be effective. It was obvious that chassis was not well armored for close in combat. Over time, hundreds of M551s were deployed to Vietnam, and mines and RPGs took a terrible toll. This long-range standoff weapons system was not designed for close-in combat. There has been a love-hate relationship in Armor over the controversial M551. The "Immortal Sheridan" has been in the inventory for 25 years.

I believe the requirement for light armor units equipped with AGSs is long overdue. The point I want to make in this letter is that light armor units may be deployed to areas where there is a high proliferation of man-portable antiarmor weapons. These type weapons are more effective as time passes. Doctrine and tactics must stress the need to keep AGSs away from built-up areas and dense growth that has not been cleared by scouts or infantry. We must not compromise this fine new system by not learning from the past.

BURTON S. BOUDINOT
LTC, (Ret.)
31st Editor of *ARMOR*
Radcliff, Ky.

Doubts Ability of Gliders To Carry M1 Tanks

Dear Sir:

Let's look at some technical questions regarding carrying tanks in gliders.

First, the empty weight of most gliders is approximately half the max takeoff weight of the glider. For example, the Rutan Model 77 Solitaire has an empty weight of 172 kg. and a max takeoff weight of 281 kg. (*Jane's All the World's Aircraft 1983-84,* p. 628). I doubt that you could obtain a 35-ton empty weight glider even using composite construction.

Second, using a JATO to assist the takeoff of a loaded glider (159 metric tons) is possible, but remember that you are launching something that weighs almost as much as a space shuttle. The JATO burning must be long enough to bring the glider to a sufficient altitude to enable the glider to conduct a landing if the C-5 must abort the launch tow.

Third, mid-air refueling is possible. A KC-10A can deliver 90,000 kg (115,215 liters) of fuel to a receiving C-5 aircraft 2,000 miles from the KC-10A's home base and return home (*Jane's,* p.440). The C-5 has a

Continued on Page 11

COMMANDER'S HATCH

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

"We stand on the threshhold of great change..."

The Chief of Staff cites **change, continuity,** and **growth** as he describes the Army today. This combination of factors is found nowhere more than in the Armored Force. We here at Fort Knox are dealing with tremendous change as we rush toward the 21st century, adapting to a post-Cold War world, an ever-expanding technology, and evolving missions.

While change is both inevitable and good, as we move beyond previous boundaries there are threads of continuity that run through our efforts. These focus on the continued requirement for mobile, protected firepower and the mind and heart of the professional, mounted soldier. Together, they provide the means for Armor to assure that the U.S. Army can dominate land combat.

As the new Chief of Armor, I intend to maintain continuity amid the coming changes. We do many things well at Fort Knox. We have the premier center in the world for training mounted combined arms leaders. Our superb cadre, both active and reserve, with essential contributions by our outstanding civilian work force, make this possible. We will do nothing that diverts from our long-standing focus on warfighting, training, and combat readiness of the Armored Force.

The vision shared at Fort Knox is that mounted forces continue to be an indispensable part of the nation's versatile, lethal, power projection Army. We must guarantee our nation's combat readiness and military capability by demanding excellence in training and leader development. High, consistent standards become the barometer for all components. We know Fort Knox is the finest mounted warfare training center in the world. Our job is to keep it that way.

As we consider the **growth** that accompanies **change** and **continuity**, our focus is on the very important efforts being made to use advanced technology to enhance training and operational capabilities. Distributed Interactive Simulation, Virtual Reality, and Distance Learning will greatly impact our ability to conduct effective, productive training. Digitized Battle Command, advanced sensors, and more lethal and survivable weapon systems will fundamentally change the way we fight. They will provide us the means to operate at a tempo, and with a level of lethality, that will dominate land combat and ensure decisive victory. I will discuss the specifics of these efforts in future columns.

I'm excited about how far the Army, and specifically Fort Knox, has come in the past decade. Our predecessors have left us with a healthy, viable Armor Force, along with the doctrine and training base to keep it moving forward. Just as we did through the '80s and into the '90s, Fort Knox will place its main effort in focused training and care for soldiers.

We stand on the threshhold of great change. It's a thrilling time to be a tanker or cavalryman. Together, our ideas will shape development of a capabilities-based, mission-flexible armor and cavalry force. Our battle lab and combat development efforts will define, develop, and refine the material requirements for the future. Mounted Force soldiers and technicians will test, support, and assist in fielding new equipment. Our information specialists will develop and distribute fully integrated information management systems for the digitized battlefield.

In short, we are all involved in the greatest fundamental changes in the Armor Force since its formation.

Flamethrower Tanks on Okinawa

After several false starts in the Pacific campaigns, Flamethrower tank tactics and technology Came together late in the war

by First Lieutenant Patrick J. Donahoe

Flamethrowing M4 Sherman clears the jungle ahead for accompanying infantry.

During World War II, the flamethrower distinguished itself as an indispensable weapon for jungle conditions. The main armament flamethrowing tank was the most advanced, effective, and survivable development of this weapon system. The flame tank became a symbol of American ingenuity and technology on the battlefield, although the development of an effective American flame tank was slow. They were fielded and tested in various configurations throughout the war in the Pacific. An adequate design was not employed in great numbers until the fielding of the 713th Battalion (Provisional Flame Thrower) during the fight for Okinawa.

The United States Army identified the need for a mechanized main armament armored flamethrower as early as May 1940, but even by V-J Day one had not entered large-scale production. This weapon, which would be regarded as one of the most important weapons of the Okinawa Campaign, was tested in limited numbers during operations on Saipan, Peleliu, the Philippines, and Iwo Jima. But it was not until the Ryukyus Campaign that it was fielded on a survivable platform in sizable numbers.

Prior to the employment of flamethrowers mounted on the M4 Sherman medium tank, they had been mounted on light tanks or amphibious tractors. These turned out to be too lightly armored to fight at close quarters with a dug-in, determined enemy armed with satchel charges and antitank guns of 37mm and greater caliber. The Marines fielded eight Sherman medium tank main armament flamethrowers on Iwo Jima (Kleber and Birdsell, 579) where they had great success in killing or driving underground large numbers of Japanese infantry. During an operation marked by the numerous American casualties, these eight tanks, where employed, enabled the Marines to advance with minimal casualties. While they were successful, eight tanks were just too few to have a substantial impact on the battle.

Flame Tanks in Europe

Other nations were also experimenting with this weapon. By 1944, the British had designed and used their Crocodile (flamethrowing) Churchill tank against forts and dug-in infantry in the European Theater. American observers recorded the successes of these main armament flamethrower tanks against the Germans and sent reports to the chief of the Chemical Warfare Service.

Colonel F.W. Wilkinson was a combat observer with the British 29th Division at Brest on 14-18 September 1944. He recorded how flame tanks, in conjunction with gun tanks, infantry, engineers, and field artillery, reduced a German occupied French casemented fort on the outskirts of Brest. His most telling observation was that "prisoner of war interrogation indicated that flamethrowing tanks materially reduced the will of the garrison to hold out — several cases of Germans being burned alive were reported (Wilkinson, 2).

The principles described in Wilkinson's report were later grasped by the Marines and Army in the Pacific. The tanks themselves must be survivable, they required support by main gun tanks, and they had to operate as part of the combined tank-infantry team. The demoralizing effect of flame was seen as a great benefit of the weapon (Pacific War Board Report #74, 35). Flame attacks forced holed-up infantry to surrender, move to open ground where they could be readily engaged, or retreat deep into their fortifications. Suppression by flame ensured that enemy troops were unable to bring effective fire against assaulting infantry and armor.

Auxiliary Flame Throwers

Early efforts to mount flamethrowers on American tanks resulted in two auxiliary weapons. The first was a

The British Churchill model fitted for flamethrowing was called the "Crocodile." It carried its fuel in an armored trailer and could project a jet of flame over 150 yards. These Crocodiles are seen fighting in France in August 1944.

small flamethrower mounted in the place of .30-caliber bow machine gun on the Sherman medium tank. The second development was a periscope-mounted flame gun which could be employed through either the periscope in the turret roof or the assistant driver's hatch (Hunnicutt, 402-406). These two types, while welcome by the Army as stopgap measures, were not entirely popular with the tank crews. Their short range and small fuel capacity greatly limited their utility (Pacific War Board Report #52, 1-2).

These auxiliary flame guns were severely hampered by having a maximum range of only 60 yards and a 24-gallon fuel tank (Hunnicutt, 404). This resulted in approximately 20-30 seconds of flame time before the fuel tank would run dry. If the tactical situation called for flaming to be the primary mission, this often forced the tank to retire to resupply before completing the mission.

The 711th Tank Battalion, which operated with the 7th Infantry Division on Okinawa, had particularly bad luck with its auxiliary flame guns. This unit's after-action report from the Okinawa Campaign describes three tanks destroyed and five tankers killed when the auxiliary flame thrower unit exploded after receiving battlefield damage. Two tanks of Company B were completely destroyed after direct artillery hits detonated their flame units. One Company C tank was destroyed after a mine set off the flame gun. Secondary explosions accounted for more than 80 percent of the combat deaths incurred by the 711th (711th AAR, 29-32).

The main armament flamethrowers had significant advantages over their auxiliary cousins. The 300-gallon fuel capacity was 12 times greater then the bow or periscope weapons and had a range of 100-150 yards, depending on nozzle width and fuel mixture. Although these tanks did not carry a traditional main gun, they were armed with one .50-caliber and two .30-caliber machine guns. These figures were obtained from the April 16, 1945 pamphlet entitled: "Flamethrower, Mechanized, E12-7R1 (Installed in Medium Tank, M4A1)" which describes the same capabilities as the weapons used by the 713th Tank Battalion (Provisional Flamethrower) on Okinawa.

The 713th Armor Battalion (Provisional Flamethrower)

In early November 1944, the 713th was pulling outpost duty in the Hawaiian Islands. On the tenth of that month, LTC Thomas McCrary, the battalion commander, received orders to reorganize his unit as a provisional battalion of flamethrowing tanks (Morschauser, 31). The transition was going to be a local one. McCrary was given the job of determining the battalion's table of organization and equipment (TO&E). He was directed to convert his 54 M4 Sherman medium tanks to flamethrowers using a shop which had been set up at Schofield Barracks, Oahu. The battalion supplied three officers and 60 enlisted men to assist the Naval Construction Battalion that supervised the installation (713th AAR, 1-1). Local production of these weapons was hampered by difficulty securing many of the necessary components through local suppliers. It became necessary to ship 42,911 pounds of material by air from the continental U.S. during the 56 days the tanks were undergoing the conversion (Richardson, 63).

Training had to be conducted for personnel who would be required to tactically employ, operate, and maintain these systems. The U.S. Army Pacific Area of Operations Chemical Section coordinated and directed an intensive period of training for the personnel of the 713th (Richardson, 64). The training consisted of classes for officers and NCOs, one for maintenance, another for personnel of the flamethrower companies, and another for all members of the 713th regardless of position. This training covered all operational aspects of the gun, in-

cluding first and second echelon maintenance (713th AAR, 3-1).

After its notification on 10 November 1944, the 713th Tank Battalion required less than four months to make the conversion to flame tanks and embark for the invasion of Okinawa. Prior to sailing from Pearl Harbor on 4 March 1945, the 713th had developed a unique TO&E, physically modified their equipment, developed a doctrine for its use and, most importantly, trained their people to effectively employ this new killing system.

The 713th Tank Battalion (Provisional Flamethrower) was to be attached to the XXIV Corps as part of the 20th Armored Group for the Ryukyus Campaign. The XXIV Corps SOP did not include a section on how to employ the main armament flamethrowers.

Consequently, the battalion staff put together their own doctrine. This is quite important, considering that the bulk of the battalion would be attached as platoons or sections to other tank companies or infantry units. These gaining units would be unfamiliar with the capabilities of the weapon unless the 713th published some guidelines before the campaign. "The paper was distributed to infantry divisions, tank battalions, and other interested troops in Tenth Army in order that they might become familiar with the principle of organization and tactical employment which were included" (713th AAR, 2-1). Although problems were bound to occur in combat, the unit's success in the operation attested to the value of having disseminated this information.

On New Caledonia in 1943, M3A1 light tanks were an earlier attempt to mate flamethrowers with tanks. Their flame nozzles replace the bow machine guns on the right front glacis. Inadequate fuel capacity and poor survivability limited their usefulness. Limited range of the fllamethrower can be inferred from bottom photo.

The Okinawa Campaign

Loading the ships for transport to the objective began on 22 February 1945 and was completed on the first of March. As the battalion had been given no specific mission in the Tenth Army operations order for Operation ICEBERG (the code name for the invasion), the battalion staff attempted to load the ships to meet any possible contingency. The basic unit for loading the landing ships was a flame tank platoon with its supply and maintenance complement of vehicles aboard one ship. This would enable the piecemeal, but effective, introduction of the battalion into the fray, one platoon at a time. Crucial items of ammunition, fuel, rations, and supply were divided up among the ten ships. This loading technique gave the command great flexibility in committing the flame tanks, no matter how the battalion was unloaded. It also ensured that each subunit could operate effectively by itself (713th AAR, 2-1 and 4-1).

Although the battalion arrived off Okinawa on the second of April, it did not begin unloading until the seventh. Almost the entire battalion came across the Hagushi beaches — Orange #1 and Purple #1 and #2 — on the 7th, where they were placed in an assembly area. They were given time to perform maintenance, remove waterproofing, and distribute necessary supplies while also serving as the protection for the corps supply and unloading sector. One C Company tank was lost when it drove into a hole on the reef and was deemed unrecoverable. The battalion would begin the battle

One of the 713th Tank Battalion Shermans attacks Japanese defenders along Coral Ridge, Okinawa.

with only 53 flamethrower tanks (713th AAR, 6-1).

The first action for the flame tanks occurred on April 19th, when the 7th Infantry Division faced the Japanese 11th Independent Infantry Battalion among the Rocky Crags and along Skyline Ridge (Appleman, Burns, et al., 196). The 711th Tank Battalion, in support of 7th Infantry Division, had A Company of the 713th attached on the tenth day of the fight. The flame tanks were attached to the assault companies as platoons (711th AAR, 10). The Japanese were using underground tombs as pillboxes in the vicinity of Skyline Ridge, and could not be suppressed or overrun by unsupported infantry. The flame tanks moved up with standard tanks to bring the pillboxes under fire. "Their mission was to follow the standard tanks and fire when called on. The infantry followed the flamethrowers (713th AAR, 6-3). The force of tanks and infantry "quickly moved into position at the tip of Skyline Ridge. They poured shot and flame into a cluster of enemy-occupied tombs and emplacements at the lower extremity of the ridge... This was a new spectacle for the waiting infantry, who watched fascinated. For the enemy who died in the searing flame inside their strongpoints, there was hardly time to become terror-stricken. This phase of the attack lasted 15 minutes, and then...the infantry moved up" (Appleman, Burns, et al., 196). The infantry were able to move forward and complete the destruction of these emplacements without taking the horrendous casualties that would have been suffered without the use of the flame tanks. "From this day on [the flame tanks] were used whenever conditions permitted. The infantry took to them immediately (Appleman, *XXIV Corps,* 183).

The tactical employment of tanks, both flamethrower and standard, reflected the guidance of the XXIV Corps SOP. It advised that tanks must be protected by infantry to prevent the enemy from executing antiarmor ambushes. Although the SOP does not mention flame tanks, this infantry-tank cooperation was essential to successful operations involving these weapons. The flame tanks were usually attached as a section (3 tanks) to a standard medium tank platoon. The flame tanks would remain in a forward assembly area until called forward by the tank platoon leader. They would join with the standard tanks and the infantry to accomplish the assigned mission (713th AAR, 9-2). The 711th Tank Battalion's after-action report also reflects this, "Flame tanks in operation must always be covered by at least two other tanks as well as infantry" (10).

It was important for the infantry to remain close in support of the tanks because the Japanese employed suicide squads with satchel charges as a key to their antitank tactics. The Japanese attempted "to drive the U.S. infantry away from the tank using small arms and mortars. This left the tanks "blind"... The attackers tried to remain concealed until the first volley of small arms had driven off American infantry, then they assaulted the tank" (Huber, 69).

The tank-infantry team proved almost unbeatable if the tanks, both flame and standard, were covered by infantry in close support. "There can be little question that the tanks were the most important single weapon in the American attack on Okinawa. The tank-infantry team made the battle and won the island... The tank-infantry team was devastating to the Japanese" (Appleman, *XXIV Corps*, 633).

The first engagement typified the effect that the flame tanks had on friendly and enemy morale throughout the campaign. "After the first use of flame tanks on 19 April, a general cry went up and down the front for the 'Zippos'" (Morschauser, 32). They were in such favor with American troops that "the commanding officer of one tank battalion reported that the infantry in many cases preferred to advance behind a flame tank rather than behind a standard one" (Kleber and Birdsell, 586).

The flame tank had great psychological impact on the battlefield. According to the men on Okinawa, the armored flamethrower's "value lies in its ability to drive the Jap out of his prepared positions into the open to be killed by supporting troops. Experience has proven that the Jap, regardless of his fanatical intentions to hold his ground and die for the Emperor, will not remain in his hole when flame is brought to bear on him, but will make every effort to get out and away from the flame" (713th AAR, 8-3). The results that the 713th Tank Battalion achieved on Okinawa during the period 7 April to 30 June 1945 were incredible. The battalion was credited with killing 4,788 and capturing 49 of the enemy, not including Japanese soldiers killed by escorting infantry or estimates of those trapped and sealed in caves or fortifications. These figures, when balanced against the battalion's losses of only seven men killed and one reported missing, speak to the flame tank's destructive power as well as its survivability. Of the 54 tanks which began the operation, 41 were knocked out of action. Twenty-six of these were returned to duty (713th AAR, 8-1). On the last day of the operation, 30 June 1945, the battalion had 37 operational tanks and two others in maintenance (713th AAR, 6-38). The ingenuity and hard work of the mechanics had kept the battalion at over 70 percent strength after almost three months of combat. No mechanized flamethrowers could have been replaced considering that there were no others in the theater.

The main armament flamethrower proved itself as a great force multiplier during the Iceberg operation, and it was directly responsible for keeping American casualties to a minimum. It had a devastating effect on the Japanese and was a great morale booster for the American troops who relied on it.

The key to the flame tank's success was the mounting of the weapon in the sturdy M4 Sherman medium tank, which was survivable enough to take the fight directly to the enemy's positions. Also, the inclusion of the armored flamethrower as an intrinsic part of the tank-infantry combined arms team was instrumental to its use. Had the main armament flamethrower been perfected earlier in the war, American casualties could have been reduced and the tank-infantry team could have been more effective in the Pacific war.

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First Lieutenant Patrick J. Donahoe was commissioned a second lieutenant in the Regular Army from Villanova University in 1989. He has served as a tank and support platoon leader in 2/72 Armor at Camp Casey, Korea, and as the executive officer of D Troop, 5/12 Cavalry at Ft. Knox. He has recently served as the aide-de-camp of the deputy commanding general of the Recruiting Command. He is currently attending the Armor Advanced Course.

Letters (Continued from Page 4)

capacity of 193,624 liters (*Jane's,* p. 424). The empty weight of the C-5 is 167,965 kg. Add to that a max fuel weight of 150,815 kg. and the max permissible take-off weight is 362,870 kg. The implication of this is that the C-5 must take off light when towing a loaded glider and be refueled shortly after takeoff and frequently in flight.

Fourth, let's look at landing this glider. Do not assume that landings will occur at a nice 75 knots. Rather assume that the landings will be hard and fast. The glider will require more than skids with 300 mm of ground clearance. One hard, fast landing and your glider is expensive scrap. Many composites do not break gracefully.

Fifth, let's talk about the recovery of an empty glider. How many people are required to lift a 19-meter wing segment? Or did I miss something about a crane being flown in with the M1? Would someone explain how the airborne glider grabs the tow cable from the orbiting C-5? Or how does the C-5 pick up the cable from the airborne glider? By the way, do you have any idea how long and thick this cable must be?

MARK SCHWALENBERG
Brooksfield, Wis.

More Reliable Powerplant Needed for Future MBT

Dear Sir:

I am writing to disagree with several points G.K. Hower made in response to my letter on the suitability of the gas turbine engine for MBTs. I am a civilian with no connections to the defense industry. My comments are strictly those of a former M1A1 tanker.

Mr. Hower states that the Leopard 2's diesel engine weighs 1,455 kg more than the M1's turbine engine. On a vehicle that weighs 54,545 kg (M1), that is marginal. Engine weight should only be considered after reliability and fuel consumption are compared. The Germans have an MBT that weighs nearly the same, has an equivalent weapons system, top speed, power to weight ratio, and has much better fuel consumption. This makes it much easier to support logistically. The importance of this should not be underestimated. During the ground phase of DESERT STORM, my unit (A Co, 2-70 Armor, 2d Bde, 1st AD) was on the verge of running out of fuel several times. It slowed our advance considerably. And this in a logistical environment uncontested by enemy air and ground forces.

Mr. Hower also states that the M1/M1A1 had a readiness rate of 90 percent in Desert SHIELD/STORM. This is not surprising considering that the tanks were parked in the desert with their engines off for over 90 percent of the time. What is perhaps more instructive is what happened when the tanks ran in the desert environment for a sustained period of time. My company crossed the Saudi/Iraq border at the beginning of the ground war with 14 out of 14 tanks operational. Within 24 hours we had lost five tanks, four due to engine failures (and this after a rain, with no blowing sand). My battalion commander was forced to order at one point that tank engines were to be be kept running when we halted for long periods of time, to avoid engine failures during start up. Equally disturbing is what happened to my brigade on its redeployment from Iraq to KKMC in Saudi Arabia after the war was over. In a three-day move, my company lost six tanks due to engine failures, my battalion lost 16 tanks, and my brigade (with three tank battalions) lost 60. This type of combat reliability is simply unacceptable. It also suggests that the Army should track engine failures by the hours of engine run time. The only thing a "readiness rate" of 90 percent does is look good on your OER.

I would urge those responsible for choosing a powerplant for the Future MBT, either turbine or diesel, to require drastically improved reliability and fuel consumption over those displayed by the AGT 1500. I would also urge that the chosen powerplant be extensively tested by real tankers and mechanics before introduction in production vehicles. This could be easily done in modified M1 hulls.

WILLIAM J. MCCANNA, JR.
Hoover, Ala.

Highly Recommends Two "Off the Beaten Path" Museums

Dear Sir:

Next year, as you know full well, is the 50th Anniversary of the Normandy Invasion, and the beginning of our drive across Europe. Many of you will be visiting the Continent in 1994/95. To those who are going, I would like to share something which I believe is most significant.

I fought across Europe with the 4th Armored Division, including the Battle of the Bulge. Recently my daughter lived in Belgium for three years (her husband was with NATO). When I visited her, I used her home as a base of operations and retraced the locations of many of my battlefield experiences. While doing so, I happened across two absolutely fabulous museums. I say "happened," because I had not seen them listed in travel guides, or included in any of the formal, organized tours. I found these museums to be fascinating, absorbing, highly educational, and absolutely unique — a real "must." Since they are off the "beaten path" of the tours, most American visitors, unfortunately, will miss them. I was so impressed with my visits that I have taken it upon myself to call your attention to them. If not on your planned itinerary, I urge you to make a side trip to them — it will be more than well worth your effort. I feel assured that these experiences will be as meaningful as any on your trip.

The two museums are:

BASTOGNE HISTORICAL CENTER (includes **AMERICAN MEMORIAL**). On outskirts of City of Bastogne. Account of Battle of the Bulge in MULTIVISION. Authentic uniforms, weapons and materiel of belligerents. For the first time in the world, a museum is dedicated to a single, great battle created with the help and advice of opposing generals. Presentation and portrayals so unique are now copied by other museums especially in many foreign countries.

VICTORY MEMORIAL MUSEUM. Near Arlon. Easy access motorway E25/E411; 5 km from Belgium/Luxembourg border. Most significant of all WWII museums. Immense, unprecedented displays. Commemorates Allied achievements from Africa to Berlin. 200 military vehicles; 300 uniforms on wax figures with weapons and equipment; 5 huge dioramas. Largest, most important, most specialized WWII collection — unequalled in level of quality and variety. Cafeteria — especially enjoyed by Americans. Ample parking; new overnight accommodations directly across the road.

I sincerely hope that you will find it possible to visit these two outstanding museums.

ALBIN F. IRZYK
BG, USA (Ret.)
8th Tank Bn, 4th AD

Armor in the 21st Century

by Major Harold L. Spurgeon and Stanley C. Crist

(Authors' note: The following article contains statements that some readers may find controversial, but these ideas are put forth out of a desire to maximize the role and effectiveness of Armor in future operations. The authors are pro-Armor. One is an Armor officer with two years of armor and mechanized combat experience in Vietnam; the other is a former tank commander. Consequently, it is not the authors' intent to break anyone's "rice bowl," but rather to show that those bowls have already been broken by the double-edged sword of technological progress and political change; only by acknowledging reality can we hope to deal effectively with it.)

The tank is dead. As dead as the horse cavalry that preceded it. Oh, it will remain in service for many years — due to a reluctance to change what has worked so well for so long — just as the horse cavalry was retained for almost three decades after being rendered obsolete by the machine guns of World War I. In a similar manner, the main battle tank (MBT) has become just as outmoded because of the devastating effectiveness of precision guided munitions (PGMs) and ground-attack aircraft like the AH-64 Apache and the A-10 Thunderbolt II.

Many will object to the idea that the tank is obsolete, pointing to the performance of the M1 Abrams in Operation DESERT STORM. While the Abrams is probably the best main battle tank in existence, the 1991 live-fire exercise in Southwest Asia did not — contrary to popular opinion — validate the continued use of such a weapon system. Indeed, DESERT STORM offers considerable evidence of the obsolescent nature of the tank in modern warfare.

When the 82d Airborne was deployed in early August, 1990, it was M551 Sheridans — not M1 tanks — that were airlifted to Saudi Arabia. Although the Vietnam-era Sheridan is far from being a state-of-the-art weapon system, its saving grace is that it is air-transportable in usable quantities, while the Abrams must take the much slower sea route. This is not a problem for units equipped with M1 tanks — as long as future opponents are as obliging as was Saddam Hussein. By allowing us the incredible luxury of six months of unopposed buildup, we were able to amass as many armored vehicles as was felt necessary, regardless of the weight per vehicle.

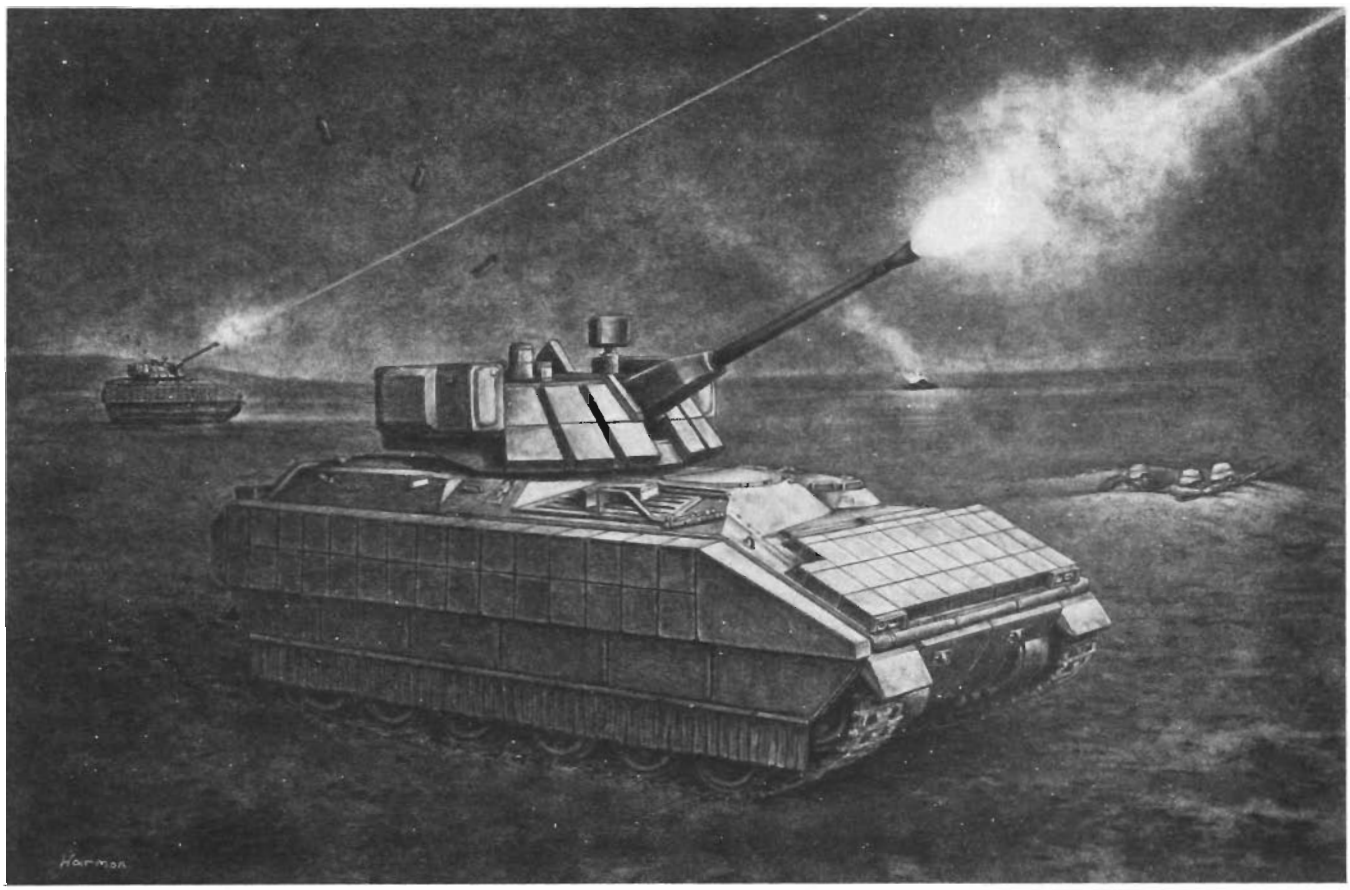
However, had the Iraqi armed forces been determined to expand their conquest beyond the borders of Kuwait, Saudi Arabia could very well have been overrun long before our ship-borne armor units would have arrived. Under such circumstances, the ability to reinforce quickly by air with large numbers of a lightweight, lightly-armored weapon system could make the difference between victory and disaster. This is the *raison d'etre* for the creation of the armored gun system (AGS), a combat vehicle intended to give the light, rapidly deployable units like the 82d a weapon system capable of engaging and destroying enemy tanks (*ARMOR,* July-August 1992).

While the AGS is a superior alternative to the Sheridan, it may not be the best possible solution to the problem. It is, in essence, a tank — a light tank (although that term has not been used since the days of the M41 Walker Bulldog), to be sure — but a tank, nonetheless. As such, it possesses almost all of the drawbacks of the main battle tank, while lacking the MBT's one big advantage: armor protection.

The AGS will not be able to absorb punishment from enemy tanks, due to its light armor, nor can it expect to outrange its opposition with only a 105-mm gun as its main armament. It is supposed to substitute speed and agility for armor protection, but can it do that while simultaneously engaging in combined arms operations with nonmechanized light infantry? (Whether it is a lightweight armored gun system or a heavily-armored main battle tank, a half-century of combat experience dictates that the tank must operate with infantry support.)

Another lesson from DESERT STORM: As Iraqi tank crews learned through bitter experience, the tank has no effective defense against attack from the air. Cupola-mounted machine guns like the .50-caliber M2 provide limited, short-range antiaircraft capability, but cannot begin to cope with an attack by a helicopter standing-off at several thousand meters. The attack helicopter, armed with antitank guided weapons (ATGWs), is quite probably a tanker's worst nightmare; it is also the main reason why the best antitank weapon is no longer another tank.

If the MBT is at a disadvantage in weaponry when compared to the helicopter, it is even more handicapped in its ability to move around the battlefield. Even the most advanced tank design is capable of only a small fraction of the operational speed and tactical mobility that helicopters can achieve.



Other ATGWs — some off-the-shelf, some still under development — will make the use of conventional armor exceedingly costly for those on the receiving end. Terminally-guided artillery and mortar rounds give (long-range and non-line-of-sight) antitank capabilities unknown in previous conflicts. Hypervelocity, kinetic energy rockets will further enhance the ability of lightweight, relatively inexpensive combat vehicles to destroy the enemy's heavy armor.

In addition to the effects of technological progress, there has been a change in the basic philosophy of equipment and employment of U.S. troops. Before the collapse of the Soviet Union, the focus was on the defense of western Europe; now, our leadership is much more concerned with "force projection." Actually, the U.S. has practiced force projection repeatedly — and relatively often, at that — during the last 50 years. These excursions were, however, treated as aberrations, sideshows to the main event at the Fulda Gap, instead of being accepted as the norm. As a result, few resources were allocated to preparing for such missions.

Except for DESERT STORM, the M1 tank (and its predecessor, the M60) has been conspicuous in its absence from these operations. In Grenada, light infantry and helicopters were used. In Panama, it was infantry, helicopters, M551 Sheridans, and U.S. Marine Corps LAV-25s. The Abrams was, of course, deployed to Southwest Asia, along with a vast number of other weapon systems. With the benefit of 20/20 hindsight, it can be argued that the ground phase of DESERT STORM could have proceeded apace without the presence of the M1; missile-firing Apaches and Cobras could have eliminated any Iraqi tanks foolish enough to offer resistance, while Bradley-mounted infantry collected surrendering enemy soldiers.

Lastly, there is the humanitarian effort taking place in Somalia, Operation RESTORE HOPE. Such aid missions (there will probably be more in the future) are not primarily combat operations, and would seem unlikely — in most cases — to require the deployment of tanks.

All of the recent operations in which the Army has been involved have utilized helicopters and infantry, while heavy armor — the M1 tank — has been employed only once. Clearly, adoption of the AGS would give Armor the capability to participate in a wider variety of scenarios, but there is another path to the future that would enable armored units to take part in virtually every operation. This course of action would require the adoption of a new armor system and a new organization that would have the flexi-

"Although the Bradley's 25-mm gun reportedly had good effect on Iraqi T-55s, a 40-mm weapon (similar to what was used on the M42 Duster) would give even greater armor penetration potential. Increasing the caliber to 40-mm also permits the use of proximity-fuzed, high-explosive, pre-fragmented ammunition — which, with an effective range of 4000 meters, should give the tank a fighting chance against missile-firing helicopters."

"The attack helicopter, armed with antitank guided weapons (ATGWs), is quite probably a tanker's worst nightmare; it is also the main reason why the best antitank weapon is no longer another tank."

bility to be deployed anywhere in the world that Air Force transports could touch down. The new armored vehicle should be:

- Air-transportable.
- Amphibious — without preparation.
- Capable of defeating enemy armor, helicopters, and infantry.
- Carry 3-4 infantrymen, in addition to the vehicle crew.

This last point will probably be the most controversial, but those who disagree would do well to recall (as was stated earlier) that tanks can rarely operate alone on the battlefield — except at undue risk — and that infantry will be needed in any likely scenario. By making infantrymen an integral part of the crew, the tank would have its own infantry support, whenever and wherever it was required. This type of combat vehicle — a Combined Arms Tank (CAT) — will assure cooperation and coordination between tankers and infantry, both in training and warfighting. Proper use of CAT-equipped units should very nearly eliminate the situation described by LTC William Betson in "Tanks and Urban Combat" (*ARMOR*, July-August 1992), wherein many of today's infantry company commanders "...were lieutenants at Campbell, Ord, or Bragg, where there are no tanks at all, and many of these infantrymen have never worked with tanks." He goes on to point out that tanks typically "...cooperate poorly with the infantry..." with disastrous consequences.

Certainly, the Combined Arms Tank should have antiarmor weaponry, but what type? The 105-mm gun planned for the AGS is a potent device, but it is probably the largest caliber gun that can be mounted on a lightweight chassis. If the combat vehicle is designed around this weapon, it would lack the potential for future upgrading to a more powerful gun. Like the Bradley, the CAT would do well to use some type of guided missile to supply antitank capability — this method has the advantage of being relatively easy to upgrade — while IFVs and older model tanks could be neutralized by a small-caliber, rapid-fire cannon. Although the Bradley's 25-mm gun reportedly had good effect on Iraqi T-55s, a 40-mm weapon (similar to what was used on the M42 Duster) would give even greater armor penetration potential. Increasing the caliber to 40-mm also permits the use of proximity-fuzed, high-explosive, prefragmented ammunition — which, with an effective range of 4000 meters, should give the tank a fighting chance against missile-firing helicopters.

Air-transportability is an obvious requirement, one easily met by minimizing the weight factor. A prime example in current use is the USMC LAV-25; eight LAVs can be taken on board a C5A transport, but only a single Abrams. In theater, the LAV can be lifted by the CH53 helicopter, giving the unique capability of an airmobile armor force. The light weight, combined with other design features, enables the LAV to be fully amphibious — a characteristic that would offer significant tactical advantages.

Since the Combined Arms Tank is a multi-role combat vehicle, it needs an organization that will make maximum utilization of its many capabilities. Rather than depending on cross-attachment of units to form combined arms teams and task forces, the CAT should be used in conjunction with the attack helicopter at the platoon level. For example, where a heavy armor platoon would have four M1 tanks, the conceptual multi-role platoon might have two CATs and two helicopters, although the actual mix would have to be determined by field testing.

The ability — more importantly, the need — to operate in a combined arms mode on a daily basis ought to foster increased cooperation and enhance the effectiveness of all involved. Combat leaders would be able to experience the capabilities and limitations of combined arms operations by having armor, infantry and aviation assets under their control. Unlike the present method — cross attachment of different types of units — this concept delivers the synergistic effect of combined arms operations without destruction of unit integrity.

The combination of the multi-role combat vehicle and the proposed organizational changes should result in a fighting force that has the combat power and the operational flexibility that will enable it to be rapidly deployed and successfully utilized.

Anywhere. Anytime.

Major Harold L. Spurgeon served three tours of combat duty in Southeast Asia, the first being with 1/69 Armor and 2/47 Mechanized Infantry, taking part in the 1970 invasion of Cambodia. In the second tour, he was assigned to 1/77 Armor, participating in the 1971 invasion of Laos. During the third tour he served with the 3/5 Armored Cavalry. Since 1975, he has commanded Armor, Armored Cavalry and Mechanized Infantry units. He is currently the Chief of the Training Division at Camp Roberts, Calif.

Stanley Crist is a former tank commander, having served with 3/185 Armor, CAARNG.

DIRECT FIRE PLANNING

Part II

by Major Derek Miller and Captain Rick Averna

Offensive Fire Planning

Discussion

In the offense, leaders tend to accept the risk of controlling direct fires "on the fly." CO/TM commanders frequently use only graphic control measures as a method to control fires. There is no fundamental difference between offensive and defensive fire control. Leaders planning offensive operations rarely have the luxury of conducting ground reconnaissance of the objective; they cannot physically walk the ground, or emplace TRPs. The challenge in the offense is to control the focus and distribution of fires on the move against a generally static enemy. Regardless, the CO/TM offensive fire plan must maximize the principles of direct fire and allow the commander to distribute, focus, and shift fires.

Techniques

Company team commanders can control offensive direct fires with the same tools that are used in the defense, (i.e. EAs, TRPs, fire patterns, and fire commands). The offensive fire plan should provide the CO/TM commander the ability to orient his force and transition it from a moving force to a base of fire and maneuver. There is no definitive answer on how to mass fires in the offense. There are, however, several techniques that may assist the CO/TM commander in planning and controlling his direct fire. We will discuss six of these techniques:

- Sectors
- Quadrants
- Target Array
- Closest TRP
- Fire Patterns
- Grid

The first four techniques utilize TRPs to control fires. TRPs assist in focusing fires on a point, multiple points, or an area; they may be oriented on either enemy or terrain. They are pre-planned to support the scheme of maneuver. As a result of the estimate process an enemy situational template (SITTEMP) is developed for the enemy's most probable course of action. TRPs are planned on enemy positions or surrounding terrain to focus platoon fires against the enemy. Others are planned on terrain features throughout the zone of attack. This allows flexibility controlling fires if the actual enemy disposition does not match the SITTEMP, or in the event of chance contact.

While a unit should cross the LD with a definite plan, it is possible the CO/TM may have to fight where they have not planned. In this event, the commander may decide to use a hasty fire control technique. Hasty fire control must still allow the commander to distribute, focus, and shift the fires of platoons. Designating hasty TRPs in the area of contact may assist in focusing the fires of platoons. Additionally, based on the situation (primarily range), engagement priorities may be effective to aid in focus and distribution.

TRPs, whether hasty or pre-planned, may be marked or confirmed to enhance fire control. Several possible methods to mark or confirm TRPs are:

- **Illumination round ground burst (visual/thermal)**
- **Smoke (mortar, arty, M203, hand)**
- **Spotting round (mortar, arty)**
- **Tracers**
- **Clearly identifiable feature (house, burning vehicle, hill top)**

A CO/TM commander should never plan to use hasty TRPs as the primary method to control his fires; preplanned TRPs are always the preferred method.

The first offensive fire control technique is **Sectors**. This technique is generally terrain oriented. The CO/TM commander assigns each platoon a sector between two or more TRPs. Platoons then focus their fires within the limits of their sector. Sectors should normally overlap between vehicles and platoons for redundancy. This technique allows the commander to give platoons responsibilities for specific areas. Sectors may also designate areas of responsibility for scanning prior to contact. This technique is particularly useful for security missions, or during initial contact when

attempting to ascertain the exact disposition of the enemy. The disadvantage of this technique is that it may not allow the commander to refine the focus of fires between platoons firing in the same sector, or ensure proper distribution for platoons covering different sectors. See Figure 1.

The second technique is **Quadrants**. Quadrants can be either enemy or terrain oriented, but are usually used in conjunction with TRPs. In this technique, the commander designates a readily identifiable feature as the quadrant center, and the quadrant is mentally superimposed over it. The feature the commander uses may be a pre-planned or hasty TRP, an enemy position, or anything else that can be recognized by the platoons (see Figure 2). This allows the commander to use a single TRP to refine focus in four different areas. In a meeting engagement, the quadrant may be centered on the enemy formation for control of focus in the absence of other control measures. The commander may also shift the quadrant to other TRPs or designate multiple TRPs as quadrants. A disadvantage of this method is that the observer angle may differ between platoons, so each platoon may see the quadrant from slightly different angle.

In a situation with detailed intelligence available, the commander may use the **Target Array** technique. This technique is enemy oriented. The commander plots TRPs against specific enemy positions, (see Figure 3). This allows him to use the actual enemy vehicles and positions to control his fires. The greater the detail and accuracy of intelligence, the greater the probability of this technique being effective. For example, if the TF scouts have provided a precise sketch of the enemy positions, the commander may plan TRPs directly on enemy positions or vehicles. It is important that the commander consider whether his platoons will be able to identify enemy vehicles or positions prior to assigning them as TRPs. Disadvantages of this method are that it may only be used with relatively detailed intelligence, and enemy positions are usually more difficult to identify than terrain features.

The **Closest TRP** technique is used exactly the same as discussed in the defensive techniques described in Part I (November-December 1993 *ARMOR*). The closest TRP is most effective when making chance contact with small elements, or for refinement of focus against small targets. Used in conjunction with "observed fires," this technique may be extremely accurate in directing fires on specific targets. Commands are issued using a direction and distance from the TRP closest to the enemy and is similar to indirect fire adjustments. The mil scale on the BFV turret ring and trunnion also provide an accurate method to shift fires, as does the mil scale in the sight reticle or binoculars for both BFVs and M1s.

Another offensive fire control technique is **Fire Patterns**. It works essentially the same as discussed in the defense, with the difference that it may be more difficult to identify right, left, far, or near of a stationary enemy in defensive positions. An approximate location of enemy positions may be determined based on IPB, then refined once in contact by observing weapons signatures or vehicles/positions. In a meeting engagement, CO/TM pattern firing works exactly the same as in the defense.

The last offensive fire control technique is the **Grid.** This technique provides the CO/TM with a method to orient observation or fires in relation to friendly movement. It is like the clock method, but divides the formation into four sectors instead of twelve, and it is oriented on the direction of movement. This technique allows the commander to quickly focus his platoons in a general area (within 90 degrees), and transition from movement to fire and maneuver. The grid divides the formation into four sectors or quarters — right front, left front, right rear, and left rear. Each quarter of the formation is designated by a number, letter, or color for orientation. The commander's vehicle is the center reference, which assists platoons in mentally visualizing the orientation of the grid. Each platoon is assigned areas of the formation for observation and security responsibilities. Figure 4 shows a CO/TM moving in a wedge formation with platoons in wedge; sections of the formation are labeled A1, A2, B1, and B2.

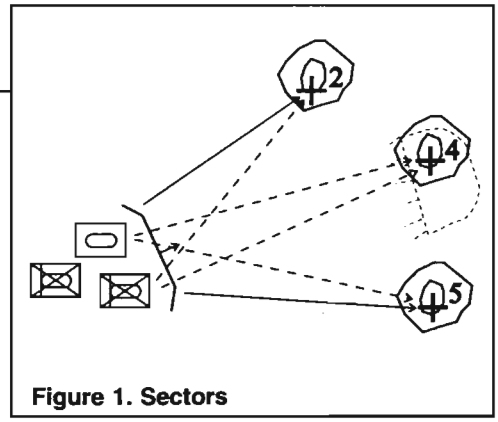


Figure 1. Sectors

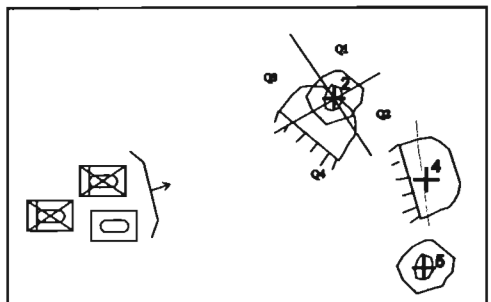


Figure 2. Quadrants in TRPs

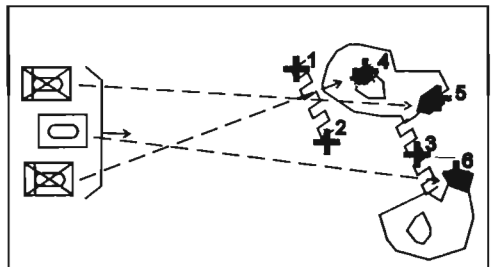


Figure 3. Target Array Technique

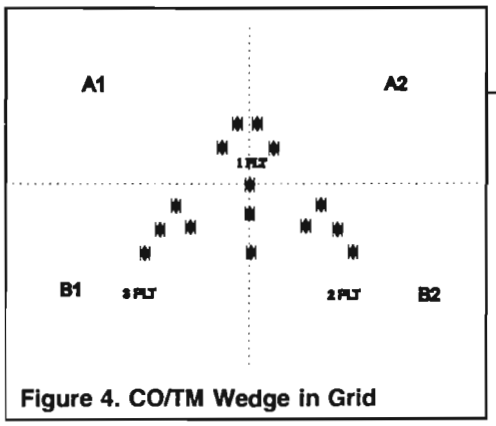


Figure 4. CO/TM Wedge in Grid

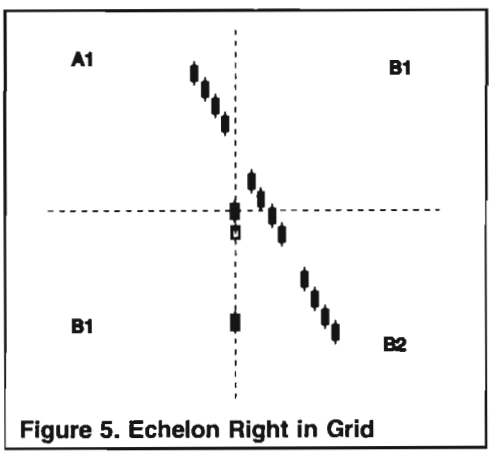


Figure 5. Echelon Right in Grid

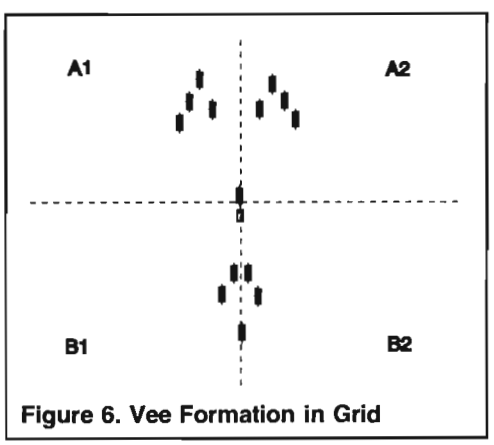


Figure 6. Vee Formation in Grid

As a company team maneuvers, each platoon is assigned a sector or area of responsibility to cover by observation or fire if the event arises. In Figure 4, the 1st Plt (Blue) is responsible for A1 and A2, 2nd Plt (Red), for A2 and B2, and 3rd Plt (White) A1 and B1. In addition, sector responsibilities may delineate which platoons can return fire upon enemy contact. Additional uses include: enemy air early warning; location of impacting artillery; and friendly unit locations and movement. For example, as a fratricide reduction measure, the CO/TM commander could warn platoons as a friendly force moves within range of a company's fires: *"Guidons, TM B moving across A1 to the breach."* Commanders may use this technique to develop a company-level SOP to support battle drills. Figures 5 and 6 provide further examples of how the grid overlays on other formations.

Ultimately the CO/TM commander may control his platoon using these or other fire control techniques with a company fire command.

Offensive Fire Control Examples

Planning direct fire control for the offense follows the same procedure as defensive fire planning. To demonstrate this process, we will discuss offensive fire control using three different enemy situations and friendly missions: actions on contact; support by fire; and seizure of an objective. In all three examples, we are Team C, a mechanized infantry CO/TM conducting offensive operations as part of a heavy battalion task force.

In each situation, the commander utilizes the estimate process to develop his scheme of maneuver and direct fire plan. Many key enemy considerations are different for the offense than they are for the defense. For example, the commander must analyze the amount of time the enemy has had to prepare his defensive positions. This can help predict the degree of resistance he can expect. He develops the enemy defensive position, detailing the location and orientation of enemy vehicles, dismount positions, weapon ranges (which define the EA), obstacle composition, etc. He identifies terrain around the enemy BP that can be used to support his scheme of maneuver and enhance fire control. These considerations are important as he plans his fires to accomplish the intended terminal effect. With this information, the commander then finalizes his fire plan to best accomplish the mission.

Actions on Contact

In the first example, our TF is conducting a movement to contact type operation, and Team C is the advance guard company. The S2 has templated enemy locations, but the template is not confirmed. There has been no significant contact with the enemy for 36 hours. The enemy has transitioned to the defense. In our TF zone, we will face an MRC at 90 percent strength with three T72s and nine BMP1s. Our estimate of the enemy's most probable course of action is that the first echelon MRCs will defend with one MRP forward as a CSOP. A portion of the S2's SITTEMP, templating the CSOP, is shown at Figure 7, (with the addition of TRPs added by the CO/TM commander). Team C's task and purpose is to destroy or force the withdrawal of all MRP size elements forward of the main defensive belt in order to facilitate the uninterrupted movement of the TF main body. Based on the lack of information about the enemy, and because TM C is the advance guard of the TF, the commander decides to move in a CO/TM wedge using traveling overwatch and leading with his tank platoon. He plans to use the grid method to orient his platoon fires as he moves; additionally, along his axis of advance, he plans six TRPs on key or identifiable terrain to assist in controlling his platoon fires. The commander issues the following instructions in the OPORD:

- **3rd Plt tank (Blue) in platoon wedge will lead, observe, and orient fires in A1 and A2.**
- **1st Plt mech (White) in platoon wedge will move on the left and observe and orient fires in B1 and A1.**

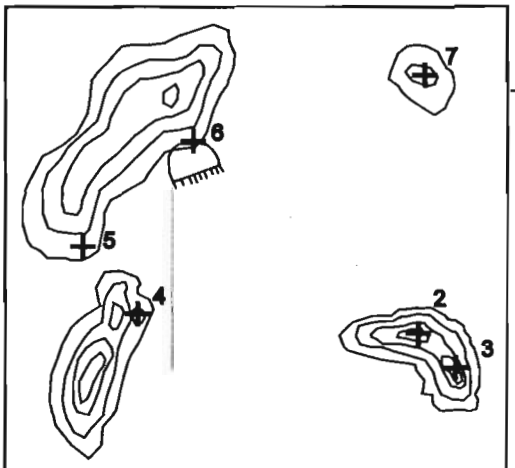


Figure 7. Unconfirmed Template

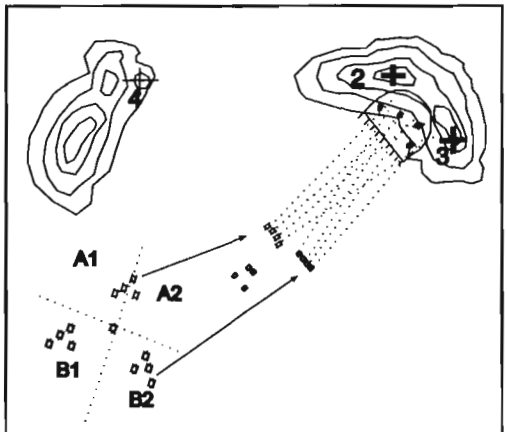


Figure 8. Actions on Contact - Sectors

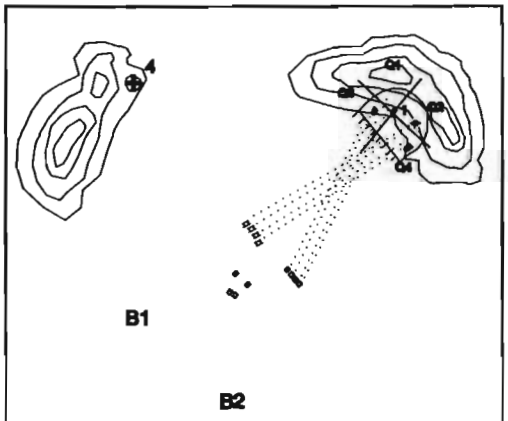


Figure 9. TRP 1 Marked as Quadrant

- **2nd Plt mech (Red) in platoon wedge will move on the right and observe and orient fires in B2 and A2.**
- **Platoons with security responsibilities in the sector where enemy contact is made will move on line and initiate simultaneous fire to suppress. On order, the company will use the closest TRP technique and platoons will use observed fires off TRP 6 to destroy the enemy.**

Team C crosses the line of departure and leads the TF along the assigned axis. Prior to reaching the templated enemy position, the lead platoon receives fire and reports:

Black 6, this is Blue 6. Enemy contact A2.

The enemy is not located as templated, so the commander adjusts his plan using the planned TRPs in the area of the suspected enemy signatures, initially orienting the CO/TM using the grid, (see Figure 8).

Black elements, contact drill A2!

Blue and Red bound on line to covered positions vicinity quadrant A2, returning suppressive fire toward enemy signatures. White automatically assumes responsibility for the remaining three sectors (B1, B2, A1). Simultaneously, the commander issues a company fire command to focus the CO/TM's fires:

Blue - Red, this is Black 6; MRP, between TRPs 2 and 3; simultaneous fire, HE, fire!

White this is Black 6; primary observation TRP 4; out!

The platoons issue their commands;

Blue - Blue 6; MRP between TRPs 2 and 3; volley fire, 2rds HE; frontal; fire!

Red - Red 6, MRP between TRPs 2 and 3; volley fire, HE; frontal; fire!

The commander continues to develop the situation. Blue and Red continue to suppress the enemy in the sector between TRPs 2 and 3. Blue's M1s lase and the platoon leader sends the range to the commander. The commander adjusts his position to gain stand-off and remain out of the enemy kill sack. The company's fires achieve suppression on the enemy. One BMP is destroyed. The commander decides to use the burning BMP as a TRP with a quadrant overlayed to more accurately focus platoon fires. He designates the destroyed vehicle as TRP 1. The TM commander issues the company fire command to destroy the enemy rather than suppress. Figure 9.

Black, Black 6; burning vehicle marks TRP 1.

Blue - Red, Black 6; shift TRP 1; TOW - Sabot; Blue Q2 &4, Red Q1 & 3; observed fire; at my command... fire!

By SOP, the wingmen fire and section leaders observe. Blue reports one BMP destroyed and Red reports one T72 destroyed. The remaining enemy BMP displaces. Team C reports withdrawal of the CSOP and continues the mission.

Support by Fire

In the next example, the TF conducts a hasty attack against the enemy's first-echelon defensive belt. The TF is to breach in order to pass the follow-on TF. The enemy has been in position for at least 48 hours with significant engineer support. The enemy's most probable course of action is that he will defend and conduct local counterattacks to block penetration. TEAM C's task and purpose is to destroy the eastern MRP(+) from SBF 1 in order to allow TM B, the task force main effort, to conduct a breach. The enemy situational template is shown at Figure 10. The commander further refines the MRP position and determines its strength: one T72, three BMPs, and 32 infantrymen. The commander plans this SBF position as an assigned position similar to a battle position. He plans its location to achieve maximum stand-off, based on gunner proficiency. He decides to use sectors to initially have his platoons locate enemy positions, and then use the closest TRP method to focus and distribute his platoon fires.

The commander issues the following instructions in his OPORD:

Upon occupation of SBF1 1st Plt (Red) scan between TRPs 3 and 4 and 3rd Plt (Blue) scan between TRPs 2 and 3. Attempt to locate enemy vehicles and positions.

Once we locate the enemy positions, we will switch to the closest TRP method, observed fires, to destroy the MRP.

1st and 3rd platoons are initially responsible for their sectors, then expect to shift based on where we locate the enemy. We will use TOW and 120-mm sabot once we change to observed fires.

2nd Plt (White) secure the right flank of the SBF position, and be prepared to assume 1st platoon's mission to maintain TOW fires on the enemy.

The company team crosses the LD and moves along the desired axis in the desired TF formation. As planned, the CO/TM bounds into SBF #1, 2800 meters from the objective, (see Figure 11). Platoons scan their sectors and inform the commander that the template is generally correct. The commander observes the enemy signatures and determines the approximate location of the enemy vehicles. He issues the initial fire command to focus platoons, (see Figure 12):

This is Black 6; Blue, TRP 3, left 50, TRP 2 right 100, drop 100; Red, TRP 3, right 200, drop 100; observed fires, TOW and Sabot, at your command!

The platoon leaders issue their fire commands:

Red-TRP 3, right 200, drop 100; Alpha Section, right BMP-Bravo Section Left BMP; TOW, observed fires, at your command!

Blue-Blue 6, Alpha Section, TRP 3, left 50; Bravo Section, TRP 2, right 100, drop 100; 2rds Sabot, observed fires, at your command!

The platoons engage. Blue reports one BMP and one T72 destroyed and Red reports one BMP destroyed. No further targets are observed in Blue's sector between TRPs 2 and 3. The CO/TM commander shifts the tank platoon fires to assist Red.

Blue, Black 6; shift TRP 3, right 200 drop 100; Sabot; observed fires; at your command!

The tank platoon leader shifts the fires of one section to assist Red. The platoon leaders crosstalk during the engagement, and the combined fires of 1st and 3rd platoons destroy the remaining vehicle. Blue reports one BMP destroyed, and the CO/TM commander issues:

All Black elements cease fire, Blue scan TRP 2 to 3, Red, TRP 4 to 3. Execute platoon reload plans.

Platoons assume their original sectors of scan with one section each, while the other section of each platoon pulls back and begins reloading ready racks and ammo boxes. Second platoon continues to maintain flank security for the CO/TM, while observing the movement of other teams and informing the commander on their progress. TM C reports the destruction of the MRP(+) and the TF CDR commits the breach force.

Seizure of an Objective

In this final example, the TF conducts a deliberate attack against the enemy's second echelon defensive belt. The TF mission is to destroy the final MRC(-) and complete the penetration of the main defensive belt in order to pass the follow-on BN TF. The enemy has been in position for at least 56 hours with significant engineer support. The enemy's most probable course of action is that he will defend from an MRC(-) strongpoint (with two T-72s and seven BMPs) and conduct local counterat-

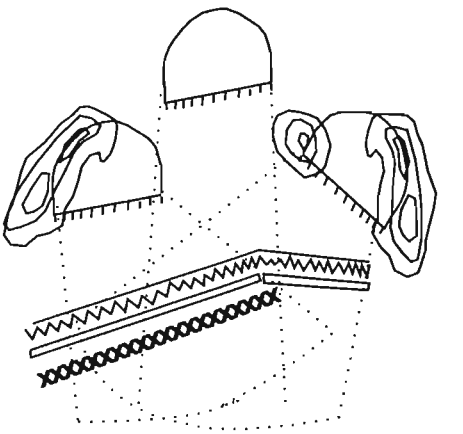


Figure 10. Enemy Situation Template

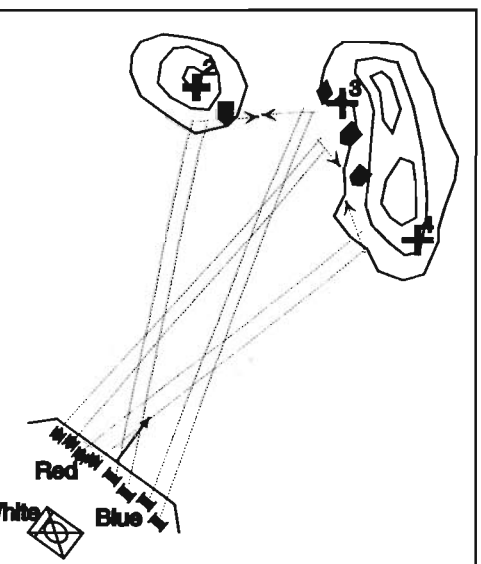


Figure 11. Using Sectors to Scan and Quadrants to Control Fire

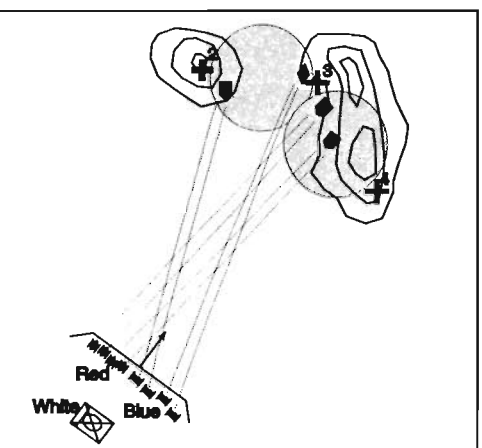


Figure 12. Using Closest TRP Method to Control Platoon and CO/TM Fires

tacks even after he is bypassed or encircled. TEAM Cs mission is to seize the easternmost MRP, (OBJ Orange), in order to complete the destruction of the MRC(-) and pass the follow on BN TF. Team C is the TF main effort. The enemy's positions have been under friendly scout observation since the initial penetration of the first echelon approximately 20 hours ago. The SITTEMP of OBJ Orange is shown in Figure 13. Based on scout reporting, the commander knows the MRP position contains three BMPs and eight reinforced bunkers interconnected with trenches approximately 300m by 200m in depth; additionally, he knows the location of each. The commander develops his direct fire plan using the point target TRP technique because he determines that the intelligence about the enemy is detailed enough to target enemy positions. The CO/TM commander plans TRPs on the known enemy bunker and vehicle positions. He further plans to divide the MRP position, to control his supporting platoon fires, (this method is a hybrid of quadrants and fire patterns, whereby the commander divides the graphic control measure of the objective to control fires). He divides the MRP position into four parts, and labels the areas A-north, A-south, B-north and B-south, (see Figure 14). This will provide him the ability to designate specific areas for the supporting platoons to suppress as the assault element clears OBJ Orange, while avoiding confusion between elements shooting from different directions. The commander issues the following instructions:

1st Plt (Red) will support by fire from SBF C right, to suppress enemy infantry positions. Use 25-mm HEIT fires in the B-south quad against TRPs 1,5,6 — on order, shift to A-south against TRP 4.

3rd PLT (Blue) will support by fire from SBF-C left to destroy enemy armored vehicles. Use 120-mm fires in the B-south quad against TRPs 9 & 11 and on order shift 120-mm fires to A-south against TRP 10.

2nd Plt (White) will assault to clear the enemy positions on OBJ Orange.

The TF crosses the LD as planned and makes contact with the MRC(-). The lead teams seize their respective objectives and are in position to support the main effort. The TF Commander commits TM C. Team C crosstalks with the lead companies and begins its assault on OBJ Orange, (see Figure 14). As the team bounds into SBF-C the commander marks TRP6 with a pre-planned mortar illumination round to orient the CO/TM as it moves in. He issues the initial fire command:

Blue-Red, Black 6; B-south quad; volley fire, 25-mm HE and 120 sabot; at my command!

The platoon leaders issue their fire commands:

Blue-Blue 6; B-south quad; volley fire, one round sabot, frontal; At my command!

Red-Red 6;, B-south quad; volley fire, HE, frontal; At my command!

Fire!

With the BMPs at TRPs 9 and 11 destroyed and the enemy infantry positions suppressed, the commander commits the assault element (White). The assaulting platoon begins its dismounted assault (IAW ARTEP 7-7J-Drill, drills 5 & 7). White 6 reports nearing the B-south quad and the commander shifts his supporting platoons to the SW quad. See Figure 14.

Blue - Red, Black 6, shift, A-south, volley fire, 25mm and sabot, at my command.

The assaulting platoon assumes responsibility for the eastern half of the objective. Using the point target TRP method, its BFVs begin to provide close-in supporting direct fires (Figure 15) with Alpha Section covering the assault squads entering the trench. The platoon leader issues the following fire command:

Alpha Section, TRPs 1 and 5; volley fire, HE, frontal; at my command!

Bravo Section, B-north quad; observed fires: at your command!

Bravo Section continues past the initial point of entry. The section establishes an overwatch position and orients its fires in the B-north quad, to

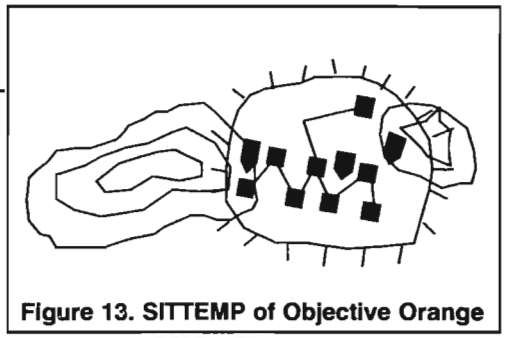


Figure 13. SITTEMP of Objective Orange

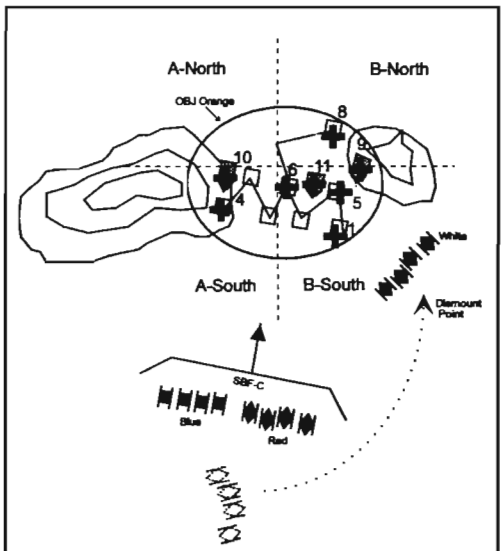


Figure 14. Supporting the Assault

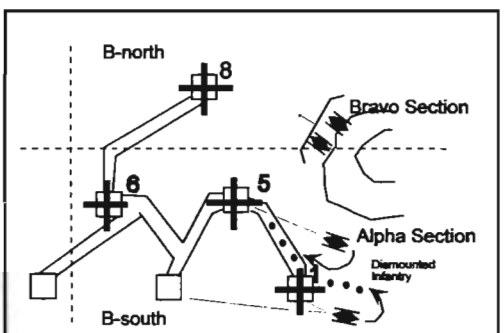


Figure 15. Entering the Trenches

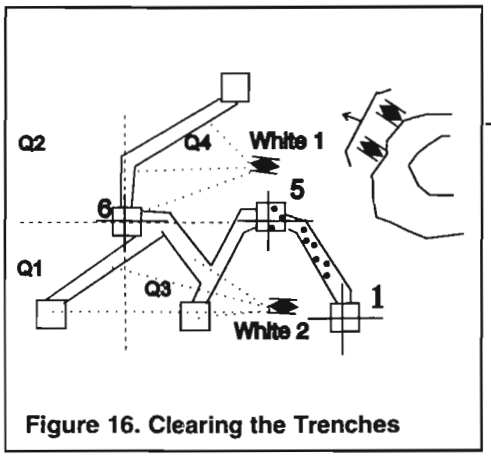


Figure 16. Clearing the Trenches

suppress TRP 8 and protect the flank of A-Section. Also, Bravo Section's infantry squad is prepared to reinforce or assume the 1st squad's task in clearing the trenches. As the operation progresses, the platoon leader dismounts. The platoon leader uses the closest TRP technique to shift and adjust his M2 supporting fires off the point target TRPs and along the trench lines. The platoon leader issues the following fire command, (see Figure 15):

White 1, White 6, Cease fire.

White 2, TRP 1, add 50, HE, bunker, at your command.

The enemy infantry begins to move along the trench systems. The platoon leader decides to turn TRP 6 into a quadrant to destroy the enemy infantry in the trenches as they attempt to displace. The platoon leader asks the BCs if they can identify TRP 6. They are unable to see it. The platoon leader directs the lead squad to mark TRP 6 with a green M203 smoke round. The squad leader fires the round, and the BCs identify it, (Figure 16). The platoon leader issues the following fire command:

This is White 6; A-section, TRP 6 is a quadrant; White-1 Q4, White-2 Q1 and 3; HE, frontal; at your command.

The vehicles in Alpha section suppress the trenches in the quadrants assigned by the platoon leader. The dismounted element assists by providing observed fire corrections to the BFVs. The platoon continues to clear the objective and the platoon leader reports passing TRP 6 and entering quad A-south. The supporting fires from Blue and Red are ceased by the CO/TM commander and the assault element (White) continues and completes the clearing operation with close cooperation between the dismounts in the trench and the mounted supporting fires of the M2s.

TF Responsibilities:

- Assigns CO/TM missions (task/purpose)
- Determines Decisive Point (TF Level)
- Plans the desired effect of CO/TM fires
- Develops task organization for mission
- Determines where and how to kill on the ground (i.e. effects of a variety of fires)
- Arrays forces and shapes the battlefield
- Develops graphic control measures to control the battle
- De-conflicts CO/TM fires as necessary
- Synchronizes direct/indirect and other combat multipliers
- Produces TF IBP products, and confirms or denies IPB for CO/TMs

CO/TM Responsibilities:

- Performs CO/TM IPB to determine how forces will enter the CO/TM EA and what formation/method
- Designates decisive point and assigns main effort
- Develops plans and controls the distribution of CO/TM fires and focus of PLT fires
- Develops and shapes CO/TM EA
- Assigns missions to PLTs (task/purpose)
- Assigns platoon responsibilities for combat multipliers
- Physically positions PLTs
- Identifies threat array (confirms or denies IPB)

PLT Responsibilities:

- Physically positions individual vehicles and crew-served weapons
- Supervises and disseminates CO/TM fire plan
- Distributes and controls PLT, section and SQD through application of fire commands, fire patterns, and engagement techniques

Crews and Dismount Leaders:

- Identifies enemy vehicles based on engagement priorities
- Ensures squad/vehicle can see the EA
- Ensures understanding of the control measures and fire plan
- Executes simple crew/squad-level fire commands
- Executes fire pattern/technique
- Sends accurate spot reports using SALT/SALUTE, etc.

Major Derek Miller is currently a student at CGSC. He graduated from USMA in 1982. He served his first tour in Germany with the 1-16th Infantry as a rifle platoon leader, scout platoon leader, and support platoon leader. Following IOAC, he served at Ft. Stewart, Ga., from 1986 to 1991, where he commanded a Bradley Infantry company and an HHC. Following DESERT SHIELD/STORM, he served for two years as an observer/controller on the Mechanized Infantry TF Trainer Team at the National Training Center.

Captain Richard Averna is currently an observer/controller on the TF Live Fire Combat Training Team at the National Training Center. He received his commission as an infantry officer from the New Mexico Military Institute and a BA from the University of Nebraska. He served in Germany with 4-41st Infantry (M2), 2d AD (FWD) as a rifle platoon leader and assistant S3. He commanded a Bradley Infantry company in 2-7th Infantry, 24th ID (Mech) during both Operations DESERT SHIELD and DESERT STORM.

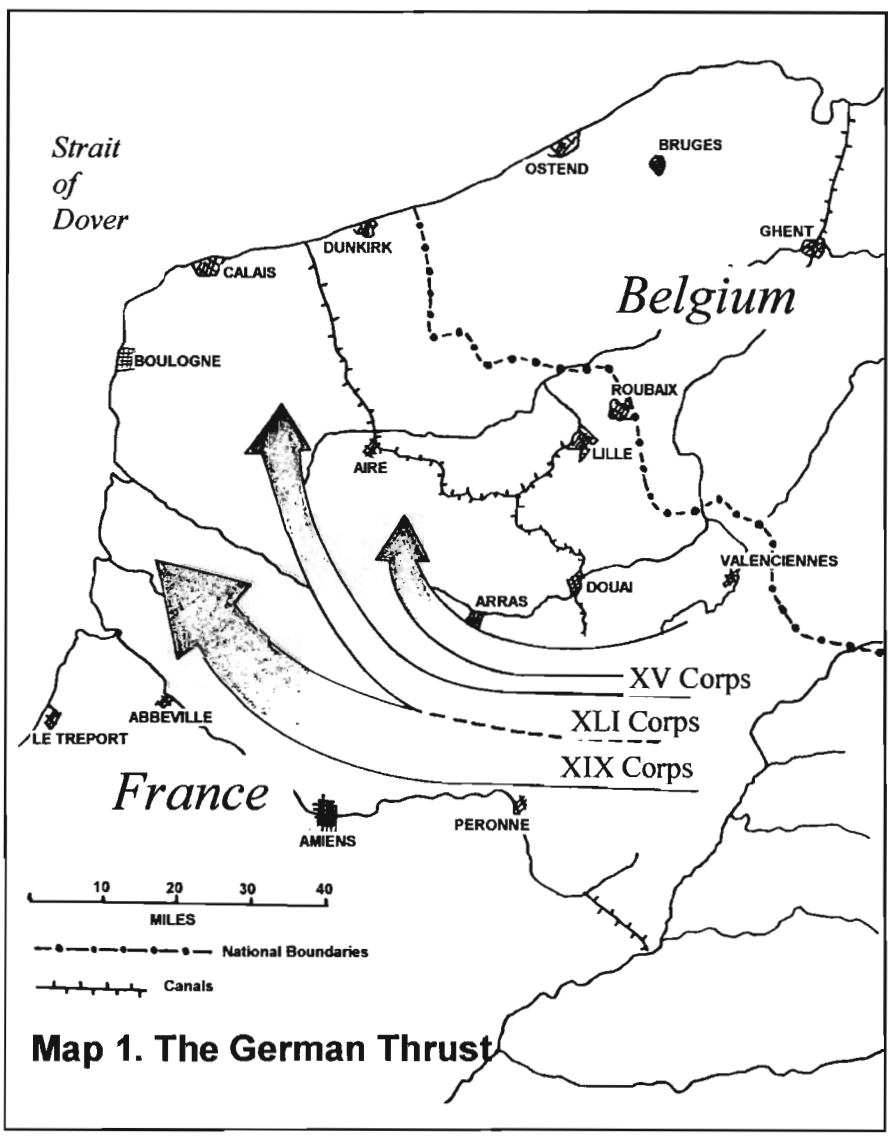
The Battle of Aire

German Flank Guard Actions During the 1940 French Campaign

by B. H. Friesen

Cavalry units traditionally carry out reconnaissance and security missions. While all these types of missions are difficult, providing flank security for a moving force is arguably the most complex. Smaller units, such as battalions or brigades, perform such missions more easily. Habitual working relationships, compact force sizes, and tolerable distances facilitate this. Conducting such operations in support of corps- or army-size movements however, begins to border on impossible. The SS V [Verfügung - Readiness] Division carried out just such an operation in support of the German thrust through the Ardennes to the English Channel in May 1940.

On 18 May 1940, seven German panzer divisions began their westward thrust through the Ardennes Forest. This caught the French and British off guard. Both armies expected an attack through Belgium, as in the First World War. They defended the Ardennes lightly, believing them to be impenetrable to armored vehicles, and moved the bulk of their forces northeast into Belgium. Using every available road and trail, German tanks penetrated the exact area the Allies felt was most secure. Achieving complete surprise, the Germans punched a hole between Arras and Péronne, and rushed towards the English Channel. Upon reaching the coast, they would isolate all British, French and Belgian forces north of the Somme River (see Map 1).



Map 1. The German Thrust

General Reinhardt's XLI Corps was the unit directly on the right flank of the penetration, with no friendly units at all to the west or north. The unit with the mission of providing flank security for the corps (and thus the entire German armored thrust) was the SS V Division. The division consisted of three motorized infantry regiments ("Der Führer," "Deutschland," and "Germania"), a towed artillery regiment, reconnaissance battalion (armored cars and motorcycles) and antitank battalion. It also had an engineer battalion, signal battalion, antiaircraft machine gun battalion, and division support elements.

The Division Commander, Gruppenführer [Major General] Paul Hausser, returned from the corps command post at 1030 hours and issued the following order to his subordinate units:

"Secure the corps' right flank. If the enemy attacks, turn east, attack the enemy and push him back towards the east."

The division deployed in three march groups. The Regiment "Der Führer," the advance guard, began moving at 1330 hours. Its lead element was Hauptsturmführer [Captain] Johannes Mühlenkamp's 15th Motorcycle Infantry Company, equipped with motorcycles and machine guns on side cars.

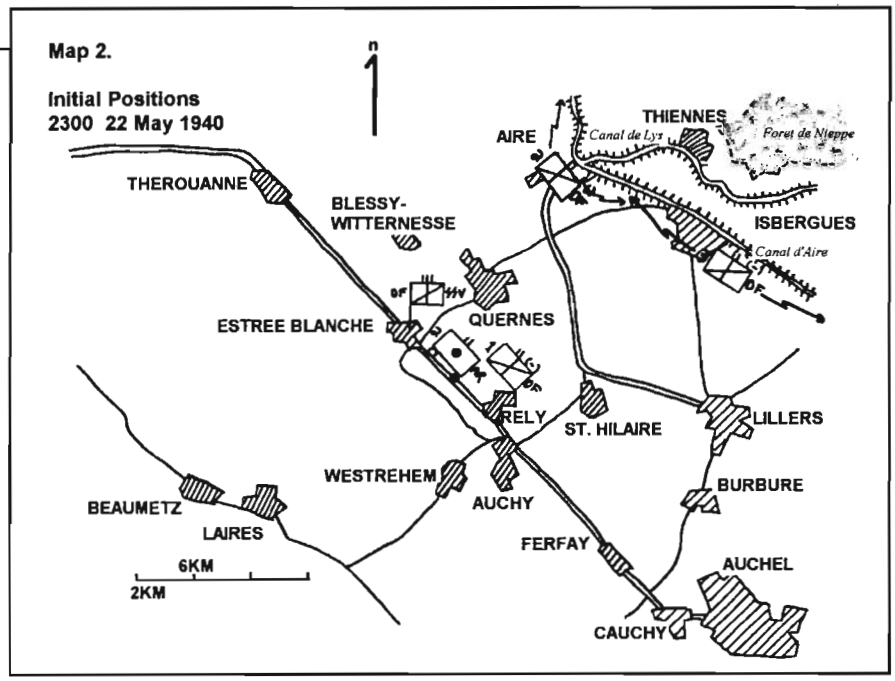
Following the 15th Company were the 2d Battalion/DF, the 2d Battalion of the SS Artillery Regiment, the regimental staff, the 1st Battalion/DF and the 3d Battalion/DF. All subordinate units provided their own flank security. The artillery battalion's location enabled it to provide protective fire for the entire march group with primary emphasis forward. Barring enemy contact, the march group's final objective was the town of Aire.

The Regiment "Deutschland" followed immediately behind the Regiment "Der Führer." The Regiment "Germania" followed the 6th Panzer Division, to the left of the main body. The latter two regiments had an organization similar to "Der Führer."

At 1858 hours, the corps headquarters sent the following radio message to the division:

"Main bodies of 6th and 8th Panzer Divisions halt in the Lys Sector. SS V Division provides flank security along the Divion-St. Hilaire line."

General Hausser ordered the regiments to secure the entire length of the corps flank and organize for a defense towards the northeast. The Regiment "Der Führer" secured the Estrée Blanche-Rely-St. Hilaire area (see Map 2). The advance guard and 2d Bn/DF (reinforced by the 2d Company from the 1st Bn/DF) deployed in and around the town of Aire. The 3d Bn/DF(-) assumed positions along the Canal d'Aire, with some of its companies in reserve to the south. The 1st Bn/DF(-) and 2d Bn of the SS Artillery Regiment deployed in and around Blessy and Rely as the regimental reserve. The entire Regiment "Der Führer" organized for a defense in depth. It would bear the brunt of the impending attack.



Shortly after midnight on 23 May, isolated shots began to ring out along the Canal d'Aire. These shots became weak enemy probes against the regiment's forward outposts by 0400 hours. The SS troopers were becoming edgy in the face of what they felt was an impending attack. Reports of enemy contact grew like a crescendo until the regimental command post heard the sounds of combat erupt from the direction of Aire. The night was pitch black, making observation completely impossible. This resulted in a lack of detailed reports by the forward outposts and even the units themselves. Something was happening out there, but the regiment's leaders did not know its magnitude.

* * *

Untersturmführer [Second Lieutenant] Schulze cursed as he approached the outskirts of Aire at the head of his reinforced platoon. As part of the 7th Company, he was responsible for securing the Aire bridge with his platoon and attached antitank guns. The only problem was that this was surely one of the darkest nights in history. He could not even see his hand in front of his face! Making it through the congested streets of Aire without killing or injuring one of his men would undoubtedly be one of the "leadership challenges" his commander was so fond of.

About halfway through the town, Schulze suddenly found his path blocked by a vehicle. He dismounted and discovered a serpentine armored column winding its way through the streets. Those damned tankers from the panzer division were obviously out of their assigned sector again. Schulze still had his mission to think of, so he joined the column to reach the northern edge of Aire as quickly as possible.

The advance was very sporadic. Schulze's impatience increased each time his vehicle lurched to a stop as the column halted again. A tank blocked his way for several minutes, refusing to budge. Schulze's patience reached its end. He jumped angrily out of his vehicle and climbed to the top of the tank. He tapped on the shut hatch with his tobacco pipe. It swung open with a loud, metallic click, and a torrent of French greeted Schulze! The hair on the back of his neck stood up, but he cleverly gave no answer. Instead, he ran back along the length of his platoon, silently ordering the men to unhitch the antitank guns. They then man-handled them into po-

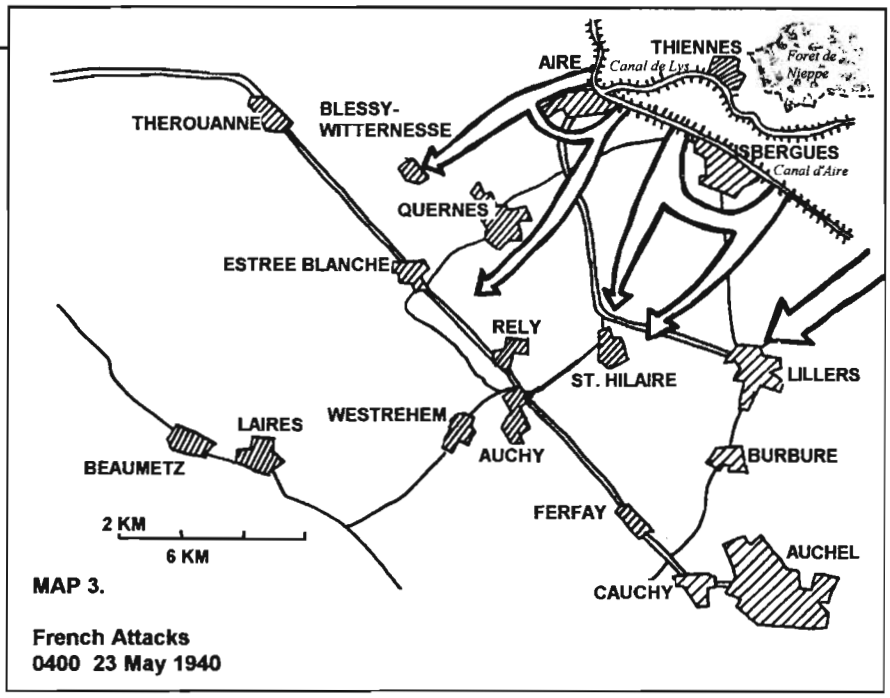
sitions along the side streets. While they did so, Schulze quickly positioned his infantrymen in the houses and gardens along both sides of the road. Within the space of five minutes, his platoon was in position.

In spite of the situation, Untersturmführer Schulze could not help smiling when he thought of the chaos that would erupt shortly. When he was sure all his guns had found their targets, he ordered the one he was standing beside to open fire. The others joined in a split second later. The surprise and confusion were absolute. Antitank rounds ripped through the French armor at point-blank range, causing violent, brilliant explosions along the length of the column. The French had absolutely no idea where the fire was coming from. Amidst the screams of the wounded and dying, the tankers sought refuge in the houses along both sides of the road. They rushed directly into the waiting German infantry. Once the initial confusion passed, the French defended themselves bravely and shot up all of the antitank gun prime movers. They withdrew from Aire, leaving 20 of their destroyed tanks behind. Schulze's platoon did not suffer any casualties.

* * *

By dawn, the enemy probes had become a full-scale infantry attack with armor support. French forces had already penetrated the regiment's security positions in the darkness and had bypassed Aire, leaving the 2d and 7th Companies isolated there. French tanks and infantry poured into Blessy, where command posts of the 2d Bn/DF and the artillery battalion were co-located, along with an artillery battery. This surprised the Germans, but they managed to defend the command posts with the help of direct fire from the artillery battery. The 2d Bn/DF command post had meanwhile alerted the rest of the battalion and issued orders for a counterattack. The counterattack occurred almost immediately, pushing the French out of Blessy.

The 3d Battalion was having a difficult time also. The entire unit stretched thinly along the Canal d'Aire, guarding three crossings in a very wide sector. The 9th Company, under Hauptsturmführer [Captain] Heinz Harmel, guarded the most important crossing near Isbergues. A force of 50 French tanks and one battalion of infantry smashed through the 9th Company and pushed towards St. Hilaire in two separate columns. This heavy blow also isolated the 10th and 11th Companies in the 3d Battalion's sector. Fortunately, Harmel's company did not disintegrate, but established isolated pockets of resistance. More important, it sent accurate reports to the regimental command post and apprised the commander of the situation. The 10th and 11th Companies were still combat effective. They began attacking the rear of the enemy units that had bypassed them.



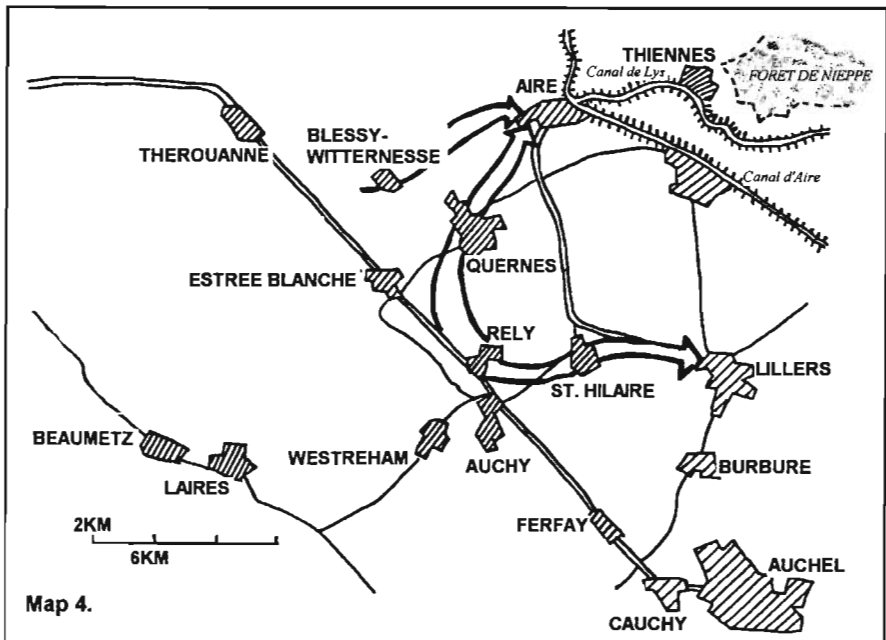
MAP 3.

French Attacks
0400 23 May 1940

The situation was now extremely critical. Two battalions of French tanks supported by two battalions of infantry had crossed the Canal d'Aire, penetrating deep into the regimental sector. Unknown to the division, another French armor and infantry force approached Lillers from the northeast (see Map 3). The Regiment "Der Führer" was in danger of annihilation. More important, the vulnerable support elements of the XLI Corps were in danger of destruction should the French tanks penetrate the corps' flank as well. This would temporarily halt the German advance to the English Channel and give the Allies a chance to evacuate or establish a stronger defensive line.

Oberführer [Colonel] Georg Keppler, commander of the Regiment "Der Führer," formulated the following plan. The 1st Bn/DF(-) would deploy out of Rely and attack through Witternesse towards Aire. The elements of the 2d Bn/DF that had withdrawn would simultaneously attack out of Blessy towards Aire. Both battalions had the mission of pushing the enemy back across the Canal d'Aire in the Aire sector. The remainder of the 3d Bn/DF was to advance east through St. Hilaire, towards Lillers, to force the enemy back across the canal there (see Map 4).

The 1st Bn/DF(-) captured Witternesse by 1100 hours and pushed the enemy back to Aire. The unit also captured a sizable number of prisoners. The 2d Bn/DF(-) reached the western edge of Aire at 1200 hours. It immediately attacked the weak enemy defensive positions there. Barely one hour later, the 1st Bn/DF(-) entered Aire from the south almost unopposed. The French had shifted the bulk of their defenders to the west against the 2d Battalion. The 1st Battalion made contact with the isolated 2d and 7th Companies. These two units had begun fighting their way



Map 4.

German Counterattacks
0900 23 May 1940

south when they heard the sounds of battle in western Aire. The 1st Bn/DF then secured the canal crossings at Aire, thereby sealing off one of the prongs of the French attack.

Gruppenführer [Major General] Hausser had meanwhile judged the main point of effort to be in the Regiment "Der Führer's" sector. He directed the Regiment "Germania" to send a company to St. Hilaire to assist the 3d Bn/DF halt the enemy advance. The remainder of "Germania" would remain south of the Regiment "Der Führer" to provide depth to the guard operation. The Regiment "Germania" sent its most mobile unit, the 15th (Motorcycle Infantry) Company, north to St. Hilaire to link up with the 3d Bn/DF(-). The company had supporting antitank guns. At 0700 hours, the 15th Company's lead elements entered St. Hilaire from the south, exactly the same time that a French tank unit entered the town from the east.

The two units became hopelessly intermingled and vicious fighting broke out in the town. The commander of the 15th Company reported his predicament to the Regiment "Germania's" command post, requesting additional antitank support. The company assumed defensive positions in basements, barnyards, and side streets. It positioned antitank guns at critical avenues throughout the town. The antitank guns quickly knocked out three French tanks and several fuel trucks on the main road, creating a bottleneck for the French armored column. Observers from the 15th Company spotted a long column of tanks halted along the St. Hilaire-Lillers road and relayed this information to the regimental command post.

At 0800 hours, the 3d Bn/DF(-), under the command of Sturmbannführer [Major] Otto Kumm, entered St. Hilaire from the west and made contact with the 15th Company/"Germania." The only units Kumm had at his disposal were elements of his 9th and 12th Companies and a platoon from the battalion's antitank company. This was his unit's first encounter with tanks and the soldiers were very apprehensive. Kumm personally led attacks against individual tanks, destroying them by placing satchel charges under their turrets or throwing grenades into their hatches. His dynamic leadership dispelled the myth among his troops that tanks were invincible. In the next hour, 13 French tanks went up in flames to his infantrymen and antitank gunners. The 3d Bn/DF(-) turned the St. Hilaire bottleneck into a road block for the French armored column.

Gruppenführer [Major General] Hausser immediately dispatched the division's antitank battalion to the area south of the St. Hilaire-Lillers road. By noon, the entire French armored column was nothing but burning hulks.

The Germans captured a total of 500 French prisoners in St. Hilaire. The 3d Bn/DF(-) then advanced to Lillers, capturing the town at 1130 hours. The 10th and 11th Companies joined it there, having fought their way south from the Canal d'Aire. The 15th Company/"Germania" remained behind in St. Hilaire and reconnoitered north to maintain contact with the enemy forces there.

By the afternoon of 23 May, the Regiment "Der Führer" had sealed the first French penetration at Aire and pushed the second one back to the high ground around Isbergues. Mopping up operations began in the recaptured territory, but the battle was not over yet.

* * *

The division reconnaissance battalion had recalled all its patrols north of the Canal d'Aire that morning. Some had not been able to make it back. Untersturmführer [Second Lieutenant] Fritz Vogt commanded just such a patrol of motorcycle infantry and armored cars. While moving south towards Mazinghem, he observed a French column crossing the main road in an easterly direction. Vogt frowned, his boyish face concealing combat experience and tactical ability far beyond his years. He estimated its strength to be that of a motorized infantry battalion. He was no longer aware of the overall situation facing his division. He knew, however, that an enemy movement this size threatened the flank of both his division and the corps it guarded. Thoroughly outmatched in terms of firepower and mass, Vogt knew he would have to rely exclusively on maneuverability and surprise.

He positioned his two antitank guns in a concealed position overlooking the column. He then assembled his

motorcycle squad and two armored cars. Ordering his antitank guns to open fire on the rear of the column, he jumped onto a motorcycle and sped off. He led his small force around numerous hedges and through depressions until he had outflanked the French column. He waited less than a minute for the head of the column to appear and opened fire at point-blank range. His force adjusted its fire from the front of the column to the rear while the antitank guns he left behind did the opposite. The French column was in complete confusion. The soldiers believed that they were under attack along their entire flank.

Several minutes later, white handkerchiefs flapped in the breeze along the entire column. Vogt moved his small group in and quickly disarmed them. By the time the French realized that his force consisted of only 30 men, it was too late. The French commander shook with rage and embarrassment as it dawned upon him that Vogt had tricked him. Vogt grinned so hard he thought his jaw would break. Several weeks later, Untersturmführer Fritz Vogt received the Knight's Cross for this daring ruse.

* * *

Prisoner interrogations strongly indicated that another French armor force was moving west from Béthune. Reconnaissance patrols confirmed this. Hausser believed that this was the time to commit the entire Regiment "Germania." He directed the regiment to deploy north and south of Auchy and prepare to conduct a movement to contact to the east (see Map 5). The regiment began moving at 1400 hours and met the enemy tanks at the heights of St. Hilaire. This was the last of the French armor and the force was too small to overpower a motorized regiment supported by the division's antitank battalion. The tanks quickly lost their momentum and began to withdraw. The Regiment "Germania" pursued them, pushing the enemy back along the entire front in a great sweeping action. The antitank units destroyed many French tanks. The regiment pushed all enemy forces it did not capture or destroy back to the canal by nightfall.

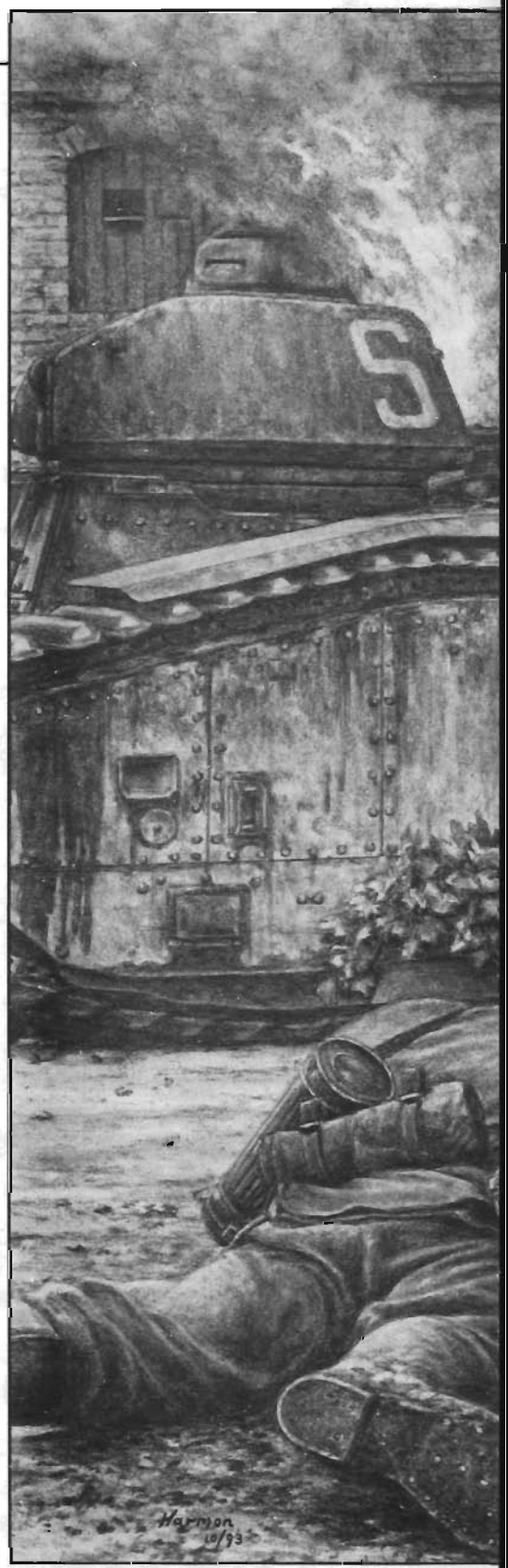
* * *

Although this flank guard operation has never received historical notoriety, its swift success contributed greatly to the smooth conduct of the entire German armored thrust to the English Channel. Outgunned and outnumbered, the division's regiments (primarily "Der Führer") fought against a superior foe supported by tanks. The enemy tried to force penetrations into the division and corps flank in three separate areas. The SS V Division halted and repulsed him on each occasion. The Germans destroyed over 60 armored vehicles and captured close to 4,000 enemy soldiers.

Why did the division perform so well? Most of its enlisted soldiers had little or no combat experience and had never fought against tanks. The Regiment "Der Führer" had not even participated in the Polish Campaign. The single key factor that carried the day for the SS V Division was *superior individual and small unit training.* When confusion reigned in the predawn hours of 23 May and units faced isolation down to platoon and squad level, the lowest level of expertise prevailed. The officers, NCOs, and men acted independently. This enabled the division to recover quickly from the blow it received and turn defeat into victory.

During 1939 and 1940, the SS V Division conducted intensive individual and small unit training programs. The leaders' first order of business was thoroughly training each soldier to be fully proficient in his military skills. These skills ran the gamut from map reading to destroying tanks with satchel charges. The soldiers thus had all the skills necessary to combat enemy tanks. This meant all soldiers, even the cooks and mechanics. They only needed a slight nudge (such as Sturmbannführer Kumm's personal leadership) to overcome their natural apprehensions. Thoroughly versed in all manners of drills, their military training took over in the absence of commands from superiors.

The leaders' second order of business was integrating these individual skills into squad, platoon, and company maneuvers. These maneuvers did not take place, however, until all soldiers had achieved mastery of their

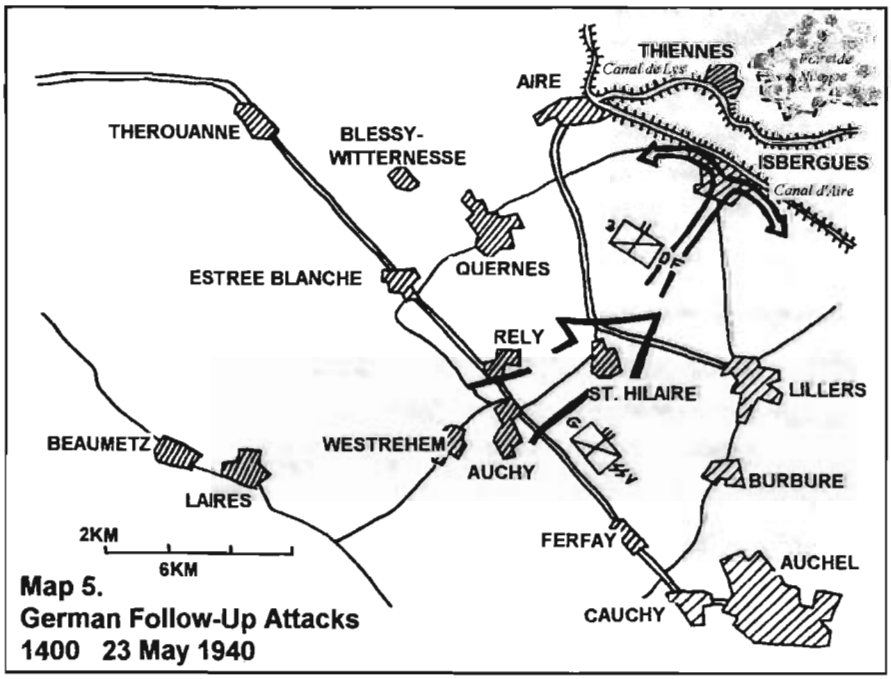


required military skills. The division leadership recognized that units frequently became isolated in the chaos of battle, whether physically or through communication breakdowns. It was thus important for isolated squads, platoons, and companies to be able to continue to fight and carry out their assigned missions. Hauptsturmführer Harmel's company continued to fight and report even after fragmented into isolated, squad-sized elements.

At right, French Hotchkiss H-35 light tanks captured en masse during the German sweep through France in 1940.

The division rarely conducted battalion maneuvers, only one regimental maneuver each, and absolutely no division maneuvers. Gruppenführer Hausser saw little value in having a division that maneuvered brilliantly if it fell to pieces upon its first contact with the enemy. This is not to say he ignored operations above the battalion level. Staffs at every level conducted extensive map and command post exercises, as well as logistic exercises. They simulated every possible type of combat operation. These exercises gave the division the requisite skill needed to plan and execute tactical operations without sacrificing the time needed to teach soldiers how to fight and survive.

The commanders' third order of business was to instill initiative into leaders at all levels, from corporal up. They placed continuous emphasis upon every leader knowing the situations and missions of their two or three higher headquarters. Reconnaissance unit leaders needed an even greater understanding of the situation. Untersturmführer Vogt's actions are a sterling example of comprehension of missions and situations four or five levels above his own. Not every leader possessed Vogt's savvy and initiative, but most of them had a firm grasp of what was going on two levels above them. In conclusion, individual training, fostering initiative, and a clear understanding of the situation two or more levels above their own enabled the soldiers of the SS V Division to carry out a textbook flank guard action for the German armored drive to the English Channel. In the confusion of the initial battle, the lowest level of expertise prevailed and carried the day.



Map 5.
German Follow-Up Attacks
1400 23 May 1940

B.H. Friesen was commissioned in Armor in 1983 from USMA. A graduate of Airborne School, AOBC, AOAC, and CAS^3, he served as an M1 tank platoon leader and company XO with 1-64 Armor in Germany. He then served as S3 air and squadron adjutant with 3/3 ACR in Fort Bliss, Texas. His final assignment was commander of I Troop, 3d ACR during Operation DESERT STORM. He is currently a computer science graduate student at the University of Texas.

Repairing the Broken Sabre: Overview of L-Series Divisional Cavalry

by Captain George Salerno

There are many views on the role and organization of cavalry. These views have caused debates from the Pentagon to Officers' Clubs around the world. The subject is both controversial and complex. One place where the debate has been raging is in the realm of divisional cavalry, where the organization has changed many times in the past 40 years.

In the September-October 1989 issue of *ARMOR* Magazine, Major General Robert Wagner wrote an article entitled, "Divisional Cavalry: The Broken Sabre." He discusses the weaknesses of the J-series divisional cavalry and suggested a possible solution of a "Super Squadron," which included integrating tanks and scouts in a platoon. The same suggestion was made by MG (then COL) Jarrett Robertson in his article, "Cavalry Missions and Structure," in the November-December 1988 issue of *ARMOR*.

In December of 1990, the 3d Squadron, 4th Cavalry, 3d Infantry Division was the first divisional cavalry squadron to transition to the L-series organization in which tanks were reintroduced into platoons. As a whole, the reintroduction proved to be a major step toward "retempering the steel of the divisional cavalry squadron" (Wagner, 39). This article will provide an overview of the L-series structure, successes and failures of the organization, and some proposed changes. These views are not based on force modifications, but taken from comments and ideas from officers and NCOs who operated in this organization — the final objective being to give the division commander a formidable asset to accomplish traditional reconnaissance and security missions, and, in an emergency, economy-of-force roles. (See Figure 1.)

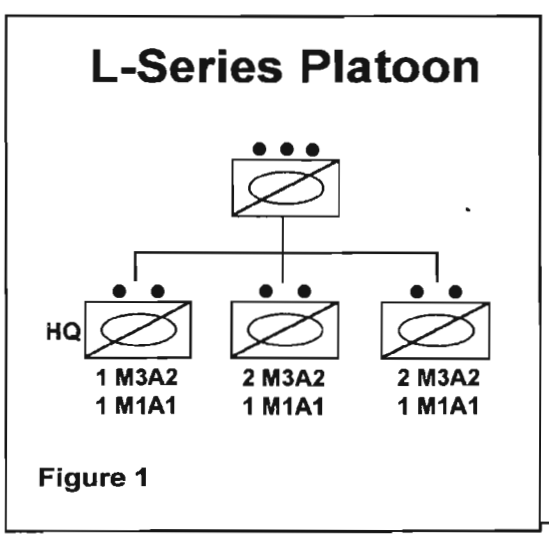


Figure 1

Tanks in Divisional Cavalry

"The organization and operational concept for divisional armored cavalry squadron envisions reconnaissance and surveillance as the principal missions" (Ghost, 6). The squadron gives the division commander the ability to see many areas of the battlefield so he can fight the division at the right place and time. Reconnaissance is defined by FM 17-95 as "the directed effort in the field to gather information about the enemy." In order to accomplish this, a cavalry squadron may need to fight at times. The cavalry needs a rapid fire antitank capability to develop situations. This does not mean cavalry wants to fight, but may have to, in order to gain a better reconnaissance for the commander.

With this in mind, one must remember the true weapon of cavalry is the scout. The scout is the eyes and ears for the division commander in the divisional cavalry squadron. The scout's tools are binoculars and radios, stealth and observation. The staff system (S2/S3) is designed to get the information to the commander as soon as possible. The scout needs protection to accomplish this mission. Another reason for the tank in cavalry is to protect the scouts who are the true "information gathering specialists" (Ghost, 2). Tanks provide the best rapid fire antitank capability. Tanks allow the scouts to conduct reconnaissance with an overwatch element of high firepower. Tanks also allow cavalry to conduct an inherent mission; counterreconnaissance. Scouts find the enemy, and the tanks remove them. This fact is especially true when conducting security operations, such as screening. Cavalry units can conduct this mission better when tanks are organic to the organization.

Economy of force is a role the cavalry squadron must be able to accomplish, though it is not high in mission priority. Tanks aid the cavalry in accomplishing this role in presenting the enemy a picture of a larger force. Cavalry squadrons are not "pocket armored divisions." Economy of force takes the cavalry away from its true specialty; gathering information. Only in this role of economy of force is fighting truly expected (Ghost, 1). Tanks organic to the division cavalry aids the squadron in fighting when it needs to fight.

History of the Divisional Cavalry Organization

Over the years, the face of divisional cavalry has changed many times. Within the last 15 years, there have been no less than six different structures. The pattern of the change seems to be a continuous circle.

In the '50s and '60s, the divisional cavalry had the same structure as a regimental cavalry squadron. The platoon consisted of a scout squad, tank

section, an infantry section, and a 4.2-in. mortar, which made this a mini-combined arms team. When an air troop was added, it made the squadron a true combined arms unit. This gave the division commander a cavalry asset with great flexibility (Robertson, 30).

From 1970-73, a "baseline" platoon consisted of five M114s, three M551s, one M113, and an M106 mortar track. In 1973-75, the M114s were replaced by M551s. Thus, the platoon had six M551s, one M113, and an M106. In 1975, the platoon dropped the mortar and added four more M113s. It now had five M113 scouts and six M551 light tanks. In 1978, main battle tanks were reinstated, giving a platoon four M60s and five M113s. ITVs were also used within this organization. Finally, the J-series in 1984 took away the tanks and gave the platoon six M3 Bradleys. It's easy to see how MG Wagner can ask "Have we broken the sabre?" (Wagner, 35-36).

In 1989, USAREUR pushed for putting tanks back into divisional cavalry, and in December 1990, 3d Squadron, 4th Cavalry was issued its M1A1s. The squadron has since gone through two Grafenwoehr rotations and two CMTC rotations in which the squadron was evaluated as a whole.

Cavalry Platoon

The base for the L-Series is the cavalry platoon (Figure 1). The change from the J-series scout platoon is the addition of three M1A1s and the loss of one M3A2 CFV. The personnel would vary, depending on the vehicle — 19Ds on M3A2s and 19Ks on M1A1s. The one exception is the platoon sergeant, a 19D, but operating out of the M1A1. All other ancillary equipment within the platoon remained the same.

The organization of the platoon proved to be outstanding. It allowed leaders to have much more flexibility in the execution of missions. The platoons generally operated in three sections, two consisting of two M3s and an M1 and one with an M1 and an M3. Many other combinations could be used depending on METT-T. The platoon still kept the same mission profile (Figure 2), but the addition of tanks gave more staying power in defense and delay missions. Also, it gave the section another set of eyes forward to find the enemy.

One question that arose was whether the platoon was too large for a new lieutenant to command. This did not prove to be a problem, for many reasons. First, many of the lieutenants were graduates of the Scout Platoon Leaders Course (SPLC), which gave them a very good grasp of cavalry operations. During SPLC, lieutenants sometimes operated with 10 HMMWVs under their control. Another reason command and control was not a problem was that many of the NCOs had a good knowledge of the tactics to be employed by the section. This was especially true of the 19Ks who know their roles during reconnaissance missions. Finally, the organization developed teamwork, which would not be possible in an ad hoc organization. The tanks and scouts could train together and know each other's capabilities and limitations.

The move to make platoon sergeants 19Ks could be a mistake. Reconnaissance is the mission of the platoon, not tanking. The platoon sergeant needs to be a 19D because he not only trains the platoon, but also the

Division Armored Cavalry Squadron Mission Profile

ECHELON	RECON	SECURITY	OFFENSE	DEFENSE	OTHER OPERATIONS
Cavalry Squadron	Zone	Screen	Movement to Contact	Defend in Sector	Tactical Combat
	Area	Guard	Hasty Attack	Delay	Facilitate Movement
					Restore Command and Control
					Area Damage Control
					Special Purpose (Raid, Spoiling Attack, Deception, etc.)
Cavalry Troop	Route	Screen	Movement to Contact	Defend a Battle Position	Facilitate Movement
	Zone		Hasty Attack	Defend in Sector	Restore Command and Control
	Area			Delay	Area Damage Control
Air Cavalry Troop	Route	Screen	Movement to Contact		Facilitate Movement
	Zone		Hasty Attack		Restore Command and Control
	Area				
Cavalry Platoon	Route	Screen	Movement to Contact	Defend a Battle Position	Facilitate Movement
	Zone		Hasty Attack	Defend in Sector	Restore Command and Control
	Area				Area Damage Control
					Quartering Party Task
Scout Platoon	Route	Screen	Movement to Contact		Quartering Party Task
	Zone				Traffic Control
	Area				Area Damage Control

Figure 2

platoon leader initially. The platoon sergeant needs the skills of the 19D in order to take over any mission in the absence of the platoon leader. Also, the 19D's skills vary greatly from that of the 19K.

Troop

The organization of the troop did not change at all (Figure 3). The troop does increase it firepower with the addition of nine M1A1s, giving it better punch in the counterrecon battle and in defensive missions. The mission profile remains the same, as does the frontage, 9-15 km (3-5 km per platoon). Unfortunately, due to the constraints of CMTC Hohenfels, the troop never operated to its full capability.

The troop retained its three mortars. In FKSM 17-95-4 (Test), mortars were to be employed by the platoons, however it was felt that massed fires were more important than chopping single mortars to platoons. The troop had the flexibility to consolidate the tanks at troop level under the executive officer if the situation arose. Though 3-4 Cav never operated in this manner, it was often discussed as a viable option.

Squadron

The biggest change in the squadron is the addition of one ground troop (Figure 4). The extra troop can cover another major avenue of approach and gives depth if the squadron is operating in a guard or an economy-of-force role. Its sheer size — 47 M3A2s, 27 M1A1s, 12 OH-58s, and 8 AH-1s — can free up more than a battalion in the economy-of-force role, though only in extreme situations. The squadron can present a picture of a much larger force and cause the enemy to move elsewhere, or allow the division commander to use heavy combat forces in other areas where they would be of more value. Another important aspect is that the squadron has more assets to stretch over the division front (The squadron can cover 27-45 km) and there are more assets forward to conduct reconnaissance. This overall structure gives the division commander more assets to conduct reconnaissance and security. The structure also gives him once again the option of having the squadron conduct guard missions and economy-of-force roles.

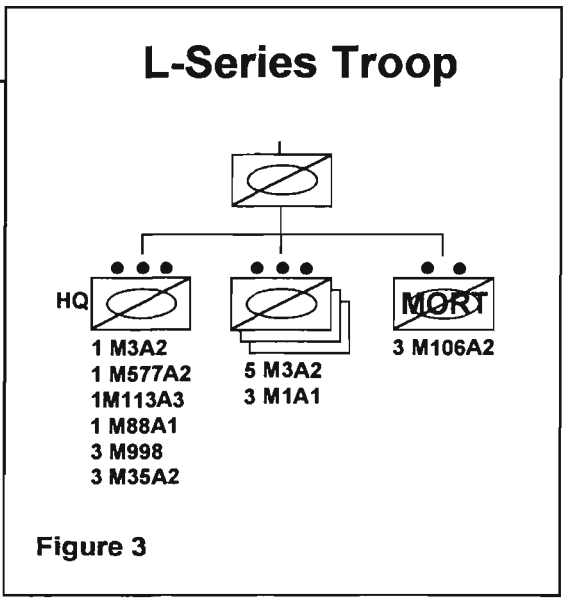


Figure 3

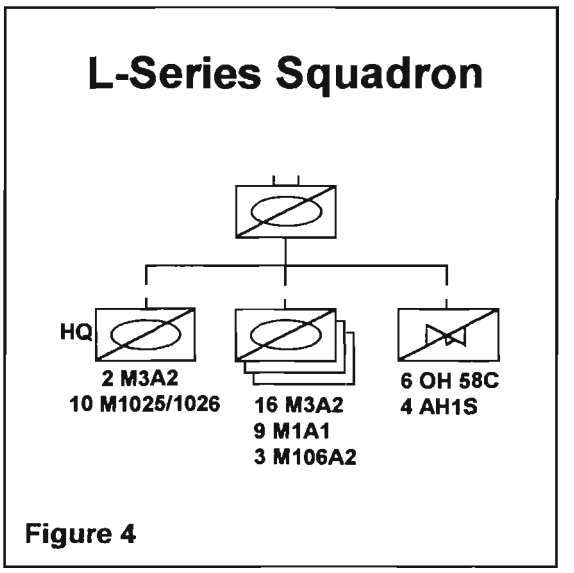


Figure 4

Another addition to the squadron is a recon platoon. This consisted of ten HMMWVs and 30 19Ds. Motorcycles are currently being fielded. The platoon was employed in the same manner as the scout platoon of an armor/infantry battalion (The addition of this platoon defied logic when having three troops' worth of scouts). During most missions at CMTC, they were combat ineffective. The platoon leader found that the terrain was too rough for the HMMWVs to conduct reconnaissance, especially when entangled with the OPFOR. A better use would be as a security force. Missions would include TOC and MSR guard, traffic control points (which they did very well), and as a command and control asset for the squadron and division commander. Another use would be to employ them where they could exploit the speed of the HMMWVs, as on the flanks. The recon platoon could screen the flanks, thus freeing up assets to conduct missions forward. The platoon could be employed forward as scouts when the squadron is used in an economy-of-force role. Though this sounds like a "palace guard" platoon, it would free up more personnel to do their given jobs. For example, divisional cavalry is not normally sliced an MP platoon. The recon platoon could fill that role when the mission dictates.

At the beginning of the change, the squadron was still under the aviation brigade. In February of 1992, the squadron became a true division asset, reporting directly to the assistant division commander for maneuver (ADC-M). The return to division control was a change long overdue. It allows the squadron to train "under the control of the headquarters under which it will fight" (Wagner, 39). It also eliminated many problems in training and support requirements. The aviation brigade had little concept of the needs of the ground forces.

Combat Service Support

Because of its size, the new organization required a large support framework. The new TO&E made provisions for some of the extra equipment and personnel. Besides the major tool sets and mechanics needed to support the M1A1, the only visible change

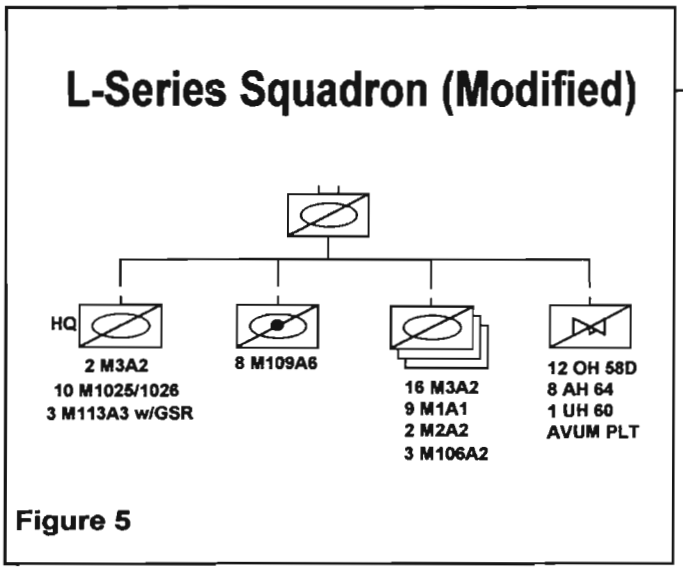


Figure 5

was to the support platoon. The platoon turned in its M923 5-ton trucks for HEMMTs. The platoon consisted of 12 cargo, 14 fuelers, and five 5-ton cargo trucks. This was adequate for the squadron; however, the squadron never had the full complement due to TO&E filling problems. The poor use of the issued vehicles made their use impossible for some time. Also, the personnel in the support platoon were changed from 88M, except for two (one being the platoon sergeant). All the rest were 19Ds who had no training or experience in handling of fuel, cargo, or the equipment. A rapid training program ensued, most of it on the job. Through all this, the support platoon kept the squadron fueled and armed through all field exercises.

There was little change in the organization of the maintenance assets. The line troops gained mechanics for the M1A1s, and squadron received four. Line troops picked up an extra 2½-ton truck for the extra tool set. The biggest change occurred in HHT, which gained its own maintenance unit separate from squadron control. All the wheel mechanics were put in HHT under the control/supervision of the HHT XO. The supervision changed in October of 1991 when HHT received a maintenance tech who took over the role of motor officer, even though it was not in the TO&E. These changes proved to be very effective. First, it relieved the squadron motor officer (SMO) of having to worry about squadron maintenance and controlling HHT. Next, it allowed the HHT XO to give better service to the HHT sections by prioritizing work to the needs of the troop. It also gave the mechanics a mission focus. Finally, it organized the HHT section as it would operate in war, in the field trains.

A major problem for squadron maintenance was lack of assets. The SMO had the squadron maintenance tech, squadron motor sergeant, and the recovery section. He had no control over any true maintenance asset, but was still responsible for squadron maintenance. Also, his recovery section only had two M88A1s, woefully inadequate to meet the squadron needs.

Communications was a problem both in CPXs and in Southwest Asia. This was especially true with the Multiple Subscriber Equipment (MSE). The squadron needed to have a dedicated node section in order to operate. This need was very evident when the squadron had to operate at doctrinal distances and needed to talk to the division.

A major success in CSS was the introduction of JP8 fuel. It is easier to acquire one type of fuel than to get both diesel and JP 4. The only problem was that the aviation fuel had to be filtered twice. At CMTC, the squadron was able to refuel from one place rather than two.

Area support was a problem. During field problems, there was some time to prepare for these issues, but it would be difficult in war. Going to the division support area was a problem, due to the great distances. The division should create a forward support team (FST) pushed down to the squadron. The FST would work closely with the HHT Commander in the field trains in providing support. A partial fix was developed during the last CMTC rotation with fuel and some ground hauling, and it seemed to work relatively well.

Proposed Changes

Though the L-series divisional cavalry squadron is generally an excellent organization, it could use some improvements to mold it into a stronger organization (Figure 5).

Some minor changes at the platoon TO&E should include better radios, the best weapon of the cavalry. The possibility of adding squad radios in order to operate OPs needs to be addressed. Until the SINCGARS or some better system is fully fielded, the cavalry's current radios are poor.

The cavalry also needs more dismounted support, especially in heavily wooded or built-up terrain. Each troop should have an infantry section of two squads. These sections could come from deactivating units. One deactivating infantry company of 12 Infantry Fighting Vehicles could provide the equipment and personnel for two squadrons (six per squadron, two per troop). One deactivating infantry battalion can provide the men and equipment to field all eight mechanized divisional cavalry squadrons in the Army. The infantry would allow a large enough force to permit patrolling between platoons during security missions. The infantry sections would also provide better internal security for the troop TOC and mortars. Additionally, infantry would enhance the troop in an economy-of-force role.

A very helpful tool for gathering intelligence is Ground Surveillance Radar (GSR). Almost always, some GSR was attached, but needs to be organic so the squadron will always have this tool available. It would greatly enhance the squadron in gaining information for the division commander, and having GSR organic would also enhance the working relationship between GSR operators and scouts. A suggestion would be one platoon per squadron, which would provide two GSR per troop. Again, these could come from deactivating units, or be taken out of corps assets and pushed down to where they would be more valuable.

Another continuing problem is fire support for the squadron, which has

no organic support. With a 155-mm howitzer battery in the TO&E, perhaps from deactivating artillery battalions, the squadron would gain the timely, organic fire support it truly needs.

Little has been said of the aviation assets (since they didn't change), but some change could be considered. First, the OH 58s should be replaced with OH 58Ds. This goes along with the idea of having more eyes forward. With its enhanced optics, the OH 58Ds can improve the reconnaissance of the air scouts tremendously. Also, AH-64s need to replace the AH 1Ss because Apaches can fight at night, while Cobras cannot. Since so much reconnaissance takes place at night, the air scouts need the protection. Also, this would provide another set of eyes forward. Another alternative is to replace all helicopters, one for one, with the AH 58D when it becomes available.

Many of these equipment changes seem to make an already large beast even larger. However, the result would be a divisional cavalry squadron much more able to accomplish all its missions and tasks.

Equipment is not the only problem with the L-series. Some organizational modifications would also be necessary.

Another change needed is to make the Aviation Unit Maintenance (AVUM) platoon from HHT a separate troop or consolidate all the air assets under one troop. The AVUM platoon already doubles the size of an air troop. Also, HHT is more ground and admin oriented. This would take a burden off the HHT commander who has little insight into the day-to-day activities of AVUM.

Service and support also needs to be addressed; this is probably the biggest problem the cavalry faces. First, the support platoon needs more cargo and fuel assets. Perhaps the addition of three of each would lighten the strain on the vehicles which are overworked as it is. Also, 88Ms and ammo specialists need to be returned to the support platoon TO&E. The reason for removal of this MOS is not understood, but their expertise is critically needed. The 19Ds need to be retrained when they come into the squadron. They are taken out of their MOS for a long period of time, which not only wastes the soldier's time, but in the long run hurts his career.

Another change is needed in maintenance. We should train as we fight. Most of the maintenance assets are at the troop level during garrison, but in the field, the troop only controls the six people who ride the M88 and the M113. We need to break the maintenance into combat trains and field trains per doctrine. This move would give the SMO control of the mechanics he would have in war. It would allow him to build a service team and support team. Thus, there would be a true squadron maintenance capability and the SMO would have the assets to control what he is responsible for. The troops would keep the mechanics that ride on their vehicles for basic organizational work. The PLL of the troops would go to the SMO since that's the way it is now. The troop XOs would have the ability to put items into the PLL they feel needed to be there. This would require a very tight working relationship between the XOs and the SMO. Also, squadron maintenance needs a total of five M88s (total of eight in the squadron) in order to meet all squadron recovery needs.

A problem which arose during the trainup and continued was training support. The manual by which the tactics and organization worked from was FKSM 17-95-4 (Test). This seemed to be an ad hoc thrown-together manual. If the L-series is to be used, we need to have a good basic manual with a good feel for divisional cavalry.

A major problem which evolved during the initial tactical training with the NET team, and continued during field problems, was the understanding of cavalry operations. The NET team noted that the XOs and platoon leaders had a better grasp of cavalry tactics than the commanders did, even though the commanders attended the Cavalry Leader's Course. The commanders all had pure tank backgrounds, and it usually showed during field maneuvers. All the platoon leaders and XOs were scouts and most attended SPLC. A simple change would be to return to the two-track system of cavalry and armor. Cavalry operations are a specialty, and a good background is needed to operate in that environment. One cannot wait for a commander to get adjusted to the system and gain a feel or knowledge for the tactics. Cavalry needs commanders who have the knowledge and experience when they take over, not when they leave.

Directions

Both divisional cavalry squadrons in USAREUR are operating under the L-series TO&E. Most units in CONUS are under the J-series or some variation of the sort. One proposal is to change the platoon into three Bradleys and two tanks, which is absolutely outrageous. This organization not only takes away the punch the cavalry needs, but it decreases reconnaissance assets by almost 40 percent. It also violates the most important principle of reconnaissance — use maximum reconnaissance forward! It also decreases the force needed to fix an enemy. It accomplishes what the enemy wants to do without firing a shot and that is to strip away reconnaissance assets. Also, it is doubtful whether a squadron could conduct a guard mission or economy-of-force role given this change. The squadron's firepower is almost cut in half.

The L-series has been looked at and is considered by some at the Cavalry Doctrine Branch at Fort Knox to be the best solution. But the L-series squadron is costly, both in materiel and support. A problem is the question of training. The L-series adds another cavalry organization that needs to be trained and supported in that training.

The compromise proposed is to organize the divisional cavalry squadron as a regimental squadron, for the sake of cost and training. The only drawback is that the regimental squadron covers less frontage than the L-series, but covers the same amount of front-

age that a J-series covers now. The organization still retains the same mission profile as the L-series and retains the firepower to conduct guard missions and economy-of-force roles.

Conclusions

The L-series proved to be an excellent divisional cavalry organization. Though the organization is not perfect, it was able to meet the needs of all the division commander's reconnaissance, security and economy-of-force needs. Again, we have come full circle into reintroducing tanks into the divisional cavalry. The assets for the divisional cavalry should be organic and the L-series is a good step in the right direction. With some minor modifications, the divisional cavalry can again become an "effective fighting member of the AirLand Battle team (Wagner, 41). With the L-series, divisional cavalry no longer has a broken sabre, but a strong retempered one.

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Captain George J. Salerno is currently the commander, C Troop, 2-4 Cav, 24th ID. He is a graduate of AOBC, SPLC, Scout Commanders Course, AOAC, Cavalry Leaders Course, and Airborne and Air Assault Schools, His previous assignments include platoon leader, A and B Troops, 3-4 Cav, 3ID; executive officer, HQ and B Troops, 3-4 Cav, 3ID; and assistant S3, 2-4 Cav, 24th ID.

Safety Notes: Tracked Vehicle Rollovers

The most deadly peacetime accident that Armor soldiers face during training is one involving a tracked vehicle rollover. For example, during a 30-day span in the late summer of 1993, there were four separate tracked vehicle rollover accidents which resulted in five fatalities, 21 soldiers injured, six vehicles damaged, and an assigned cost of over one million dollars. The true costs and impacts associated with accidents can never be accurately quantified in terms of dollars.

A review of tracked vehicle rollover accidents from January 1980 through October 1993 revealed some startling facts (Figure 1). Since 1980, the Army has averaged one tracked vehicle rollover every 15 days with an average assigned cost of $63,000. Almost one-third of these accidents involved no fatalities or injuries. This fact illustrates that these accidents can be survived if crews know how to react during the rollover.

Tracked Vehicle Rollover Accidents

January 1980 through October 1993

Total accidents	=	**312**
Vehicles involved	=	**326**
Accidents with no injuries or fatalities	=	**100**
Soldiers killed	=	**94**
Soldiers injured	=	**368**
Assigned costs	=	**$20 M**

Figure 1

The causes of rollover accidents are too varied for a specific trend to be identified. No single cause exists which we can focus on to eliminate or significantly reduce these accidents. They occur in just about every type unit, every environment, visibility, and terrain condition; at all times of the year, month, week, day; and involve just about every type of tracked vehicle. There are, however, steps that soldiers can take which will reduce the probability of a rollover accident, as well as ways to increase a soldier's chance of survival in case of a rollover. Simple DOs and DON'Ts include:

DO

- **Perform thorough maintenance and operation checks on all vehicles as prescribed by operator's manual. Identify and repair all suspect hardware.**
- **Take extra precautions and perform risk assessments during times of poor visibility, use of night vision devices, and adverse weather conditions.**
- **Practice emergency rollover drills within your unit.**

DON'T

- **Try to jump free of a rolling vehicle.**
- **Let any soldier operate a vehicle unless he is properly trained and licensed to operate that vehicle.**
- **Drive any vehicle at speeds which exceed road conditions.**

The best advice that can be given to survive a rollover accident is to always stay inside the rolling vehicle. The most prudent way to remain in the vehicle is to wear seatbelts. For those instances when seatbelts cannot be worn (e.g., when standing in the crew station commanding the vehicle or performing observation tasks), the soldier must be prepared to drop down below the hatch plane.

UCOFT Certification: An Achievable Goal

by Major General Paul E. Blackwell and Lieutenant Colonel (P) John S. Brown

The Unit Conduct of Fire Trainer is a long established feature of our Abrams and Bradley training program. The level of UCOFT achievement we should require of our gunners is less completely agreed upon, however, and the precise relationship between UCOFT training and live-fire gunnery is ill-defined. Commanders might consider requiring all crews to be UCOFT certified (i.e., computer recommended RA28 in the case of Bradleys and RA39 in the case of Abrams) before conducting live-fire gunnery at all. Let us discuss the results of such an approach and the challenges involved.

The clear advantage of UCOFT is its ability to provide vehicle commanders and gunners considerable experience at minimum expense. We have generally thought of it as a preliminary to, rather than as a substitute for, live-fire gunnery, although higher reticle aim levels do carry crews through circumstances far more challenging than ranges can reproduce. There is no practical way to replicate the UCOFT's degraded mode gunnery in live-fire circumstances. One might think that the further along crews were in the UCOFT the better they would perform on qualification tables VIII and XII. We think so, too. Recent gunnery training in the 24th Infantry Division has given us the opportunity to compare Table VIII results before and after each battalion's required 100 percent certification as a prerequisite for qualification gunnery (See Table 1). Clearly, having every crew UCOFT certified prior to live-fire gunnery made a big difference in results. This is not to mention economies realized with respect to range time and ammunition expenditure by having crews begin live fire at a higher entry level.

Arguments against insisting on UCOFT certification prior to gunnery include competing requirements, available time, personnel turbulence, and the theory that higher reticle aims bring one to a point of limited return with respect to Table VIII performance. Insofar as competing requirements are concerned, we all have to set priorities. If target effect is our first tactical priority, gunnery training will be our first training priority. We will make time for other things once we have guaranteed the time necessary to train fully qualified crews and platoons. Time is available. A good rule of thumb is that it takes about an hour of UCOFT time for every reticle aim level to be advanced. Thus, a tank crew at RA13 should be scheduled for 26 hours (but for not more than three hours a day) if RA39 is to be achieved. This rule of thumb is an average. Inexperienced gunners may take longer; experienced gunners should take less. The average does take into account the computer directed commander's engagements that mesh into the flow of the UCOFT program. Over a battalion sample, the average holds up in the aggregate. Even if a tank battalion had every single crew at RA8 — a very unlikely event even in these times of turbulence — it should only take 31 x 58 = 1798 UCOFT hours to achieve 100 percent certification. In six months there are 182 x 24 = 4368 hours. Our Fort Stewart UCOFT contract, which is probably typical, allows 18 hours a day for about 22 training days a month — or about 396 hours a month — for UCOFT. We have one UCOFT per battalion; and battalions often loan UCOFT utilization to each other. In our experience, battalions have been able to achieve 100 percent UCOFT certification by investing about 1000 UCOFT hours in the three months preceding qualification gunnery, shot twice a year. The issue is defining priorities, not time.

Personnel turbulence is our most devastating readiness detractor. Stabilizing crews in the approach march to live-fire gunnery is the greatest single challenge a commander faces. The challenge is even more formidable if, for sustained readiness, one intends to stabilize crews beyond the conclusion of Tables VIII and XII. Nevertheless, we have managed to fire crews stabilized for six months beyond the con-

TABLE VIII
Qualification

TT/BT VIII	BN #1 Before	BN #1 After	BN #2 Before	BN #2 After	BN #3 Before	BN #3 After	BN #4 Before	BN #4 After
Q1	19	17	13	6	3	21	11	10
Q2	19	18	23	11	28	18	33	1
Superior	8	15	14	20	20	5	4	9
Distinguished	7	10	10	23	9	16	6	34
Average Score	709	792	785	847	783	800	748	909

clusion of qualification gunnery. Since we fire semi-annually, the greatest period of disruption is in the months immediately before, rather than in the months immediately after, each gunnery. Rules of thumb that have served us well are to stabilize individual crews as early as you can, certify available crews as quickly as you can, go final two weeks out, and form not more than a dozen new crews at that time. A dozen new crews working three hours a day, each on two UCOFTs — one borrowed from a friendly sister unit — can certify comfortably in less than two weeks' time. Once again the issue is defining priorities; with command emphasis, all crews can go into live-fire gunnery UCOFT certified.

A theory to the contrary is that 100 percent UCOFT certification is not worth the cost. The tactical circumstances developed at higher levels of reticle aim are beyond the requirements of Tables VIII or XII. Favorable results gained by insisting on UCOFT certification result from stabilization, not on UCOFT training, per se. This argument seems chicken and egg. UCOFT certification requires stabilization, and stabilization — given command emphasis — leads to UCOFT certification. Stabilization allows crews to gain maximum advantage from other gunnery training as well. This is not to mention that UCOFT training is designed to prepare for war, not just Table VIII. It may well be that requiring 100 percent UCOFT certification prior to qualification makes crew changes so painful that intermediate level supervisors avoid them whenever possible. Whatever works. We recommend commanders consider requiring 100 percent UCOFT certification of battalions going into semi-annual qualification gunnery. It has worked for us.

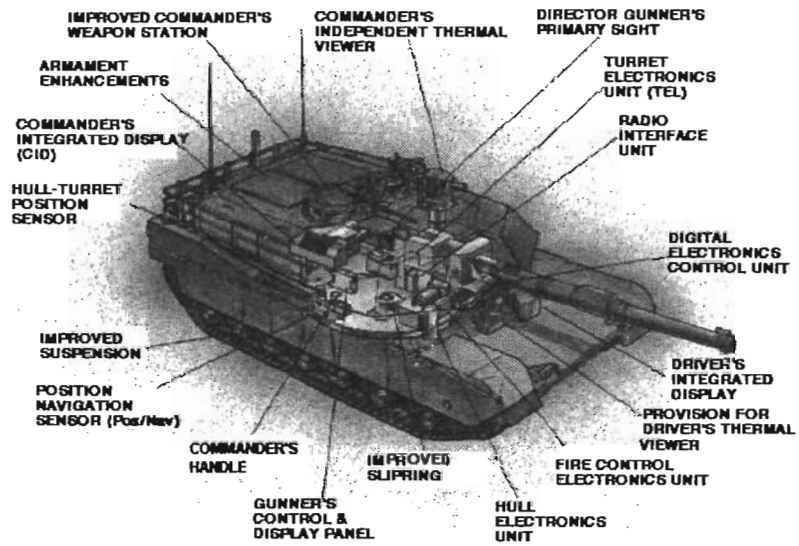
Lieutenant Colonel (P) John S. Brown, a 1971 graduate of the USMA, served as a tank platoon leader and tank company XO in Erlangen, Germany; tank company commander and brigade training officer at Fort Knox, Ky., and tank battalion operation officer, tank battalion XO, and brigade XO in Aschaffenburg, Germany. He commanded 2-66 Armor in Garlstedt, Germany and in the Persian Gulf War. His most recent assignment was as G3 of the 24th ID (M). He is to assume command of the 2d Brigade, 1st Cavalry Division, Fort Hood. He holds an MMAS from Command and General Staff College, a master's degree from the Naval War College, and a Ph.D. in history from Indiana University. His doctoral dissertation was published as *Draftee Division: A History of the 88th Infantry Division In World War II*, by the University of Kentucky Press in 1986.

Major General Paul E. (Gene) Blackwell received his ROTC commission from Clemson University where he eamed a bachelor's degree in agricultural education and a masters degree in horticulture and agricultural education. Entering active duty in June 1965, he completed the Infantry Officers' basic and advanced courses, the Marine Command and Staff College and the Army War College. He has held a wide variety of command and staff positions culminating in his current assignment as CG, 24th ID (M) and Fort Stewart. He has served in every type of US Army division — light infantry, airbome infantry, air assault infantry, mechanized infantry, motorized infantry, and armor. He completed two tours of duty in Vietnam and participated in Operation DESERT STORM and the liberation of Kuwait with the 3d Armored Division.

Training on the Digitized Battlefield

This article was developed by the Operations Group, NTC; U.S. Army Armor School; and Mounted Warfighting Battlespace Laboratory

Major General Jack Smith sat in front of his Joint Stars computer terminal inside his Battle Command Vehicle. The division G2 was pointing out some minor changes to the enemy's defensive dispositions. The division G3 quickly noted that nothing of significance had changed that would disrupt the preparatory fires scheduled to commence in ten minutes. The lead brigade would cross the line of departure (LD) ten minutes later at 0200. The corps commander had questioned MG Smith about the ten-minute preparation fire, but with his division being the only completely digitized division in the Army, a ten-minute concentrated and accurate "prep" would guarantee destruction of all enemy vehicle positions at the six breach sites. MG Smith's only concern at the moment was the endurance of his soldiers.



Cutaway illustration of improved features on the M1A2 reveals the tank's extensive suite of digital electronic devices for position locating and reporting, fire control, and target acquisition.

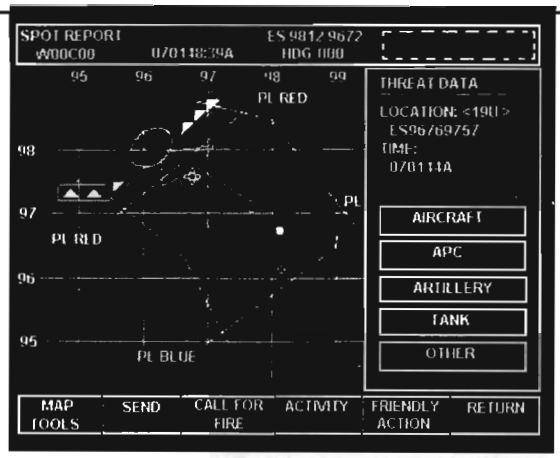
As part of the current force projection Army, MG Smith's division had been alerted and closed into theater over the past seven days. The division had been called forward, deployed by the Civil Reserve Air Fleet (CRAF), and offloaded their prepositioned ships in less than 96 hours. Since then, it had been a nonstop 72 hours to prepare the division for the start of offensive operations. He quickly reviewed his timeline.

In a few minutes, the Paladins and MLRs would initiate the preparatory fires. Each enemy location across a 5-km zone had been identified by Unmanned Aerial Vehicles (UAV) and verified by his Comanche helicopters, which then transmitted a current ten-digit grid coordinate to the fire direction centers via the Improved Data Modem (IDM). The enemy vehicles would be destroyed systematically at the breach sites with first round accuracy. After the enemy vehicles at the breach site were destroyed, his artillery would concentrate on destroying the enemy's artillery before it could respond. Each vehicle in his maneuver forces, from the M1A2s to the support platoon HEMTTs, had the breach site locations on their computer screens. Following their electronic rehearsal, brigade commanders had informed him yesterday that all combat vehicles had way points on their Position Navigation System (POSNAV). All units had run at least six computer battle scenarios within the past two hours and won on all six. The battle scenarios represented possible sequels to their plan. Smith paused to reflect.

The days of units not knowing the location of breach sites or getting lost enroute were past. Indeed, Smith would be placing multispectral smoke on both the enemy and his own forces at every breach. What would normally appear to an opposing commander to be total confusion was, in fact, part of the deception plan. Units were scattered and dispersed over a wide area but, relying on digitization, the division would, within minutes, mass and synchronize combat power. The psychological effect on the entire enemy chain of command would be overwhelming and devastating. Once more, Smith looked at the Joint Star screen as the "prep" began. The enemy reserve had not moved. Smith was pleased as he heard his Apaches and Comanches flying overhead, establishing their battle positions to prevent the enemy from repositioning to the breach sites. Looking at his Battle Command Screen, he had no doubts that the division would be at the objective, 80 km away, before 1000 hours. Over the intercom, he told his

vehicle commander to start maneuvering with the lead brigade. It was time to finally prove the worth of information age technology applied to the modern battlefield.

Futuristic? Hardly! Within the next few years this scenario will not only be possible, it will be reality. The National Training Center (NTC) recently created another milestone in its brief 12-year history by hosting the first digitally-equipped unit. The Army, lead by TRADOC's battle laboratories, is moving rapidly toward this 21st century battlefield. What will it look like? What kind of training will be necessary to guarantee continued success on the battlefield? What are the potential and most appropriate directions for training on the digitized battlefield?



An IVIS data screen showing presentation for a spot report.

Digitization will allow automated tactical reporting, enhanced position location (friendly and enemy), and improved acquisition and surveillance capabilities. Brigade and battalion commanders will gain new combat power through the use of systems like the Intervehicular Information System (IVIS), Brigade and Battalion Command and Control (B^2C^2), Joint Stars, and Improved Data Modem (IDM). Commanders and fire supporters will no longer ask for a unit's front line trace. Each vehicle will automatically update its location every time it moves. A ten-digit enemy location will be broadcast when a friendly vehicle lases a target and broadcasts a contact/spot report. Having accurate enemy and friendly locations means we can mass direct and indirect fires with first round accuracy and protect against our greatest nemesis — fratricide. Commanders will also be able to disperse their forces and protect them from indirect fire.

Position navigation will allow vehicle drivers to establish waypoints to direct them. The vehicle commander will be freed to concentrate on other critical leader tasks, such as ensuring the crew's survivability.

The fog of war will be reduced as commanders at all levels have the same picture of the battlefield, and battle command will become reality. Instead of reports with incorrect grid coordinates or inaccurate numbers of vehicles, accurate data will be immediately available. Near real time intelligence from theater, corps, and division assets can be passed "digitally" to brigades, battalions, companies, and individual fighting vehicles. Situational awareness developed from battle command training will enhance rapid decision-making by commanders. Getting inside the enemy commander's decision-making cycle will become routine.

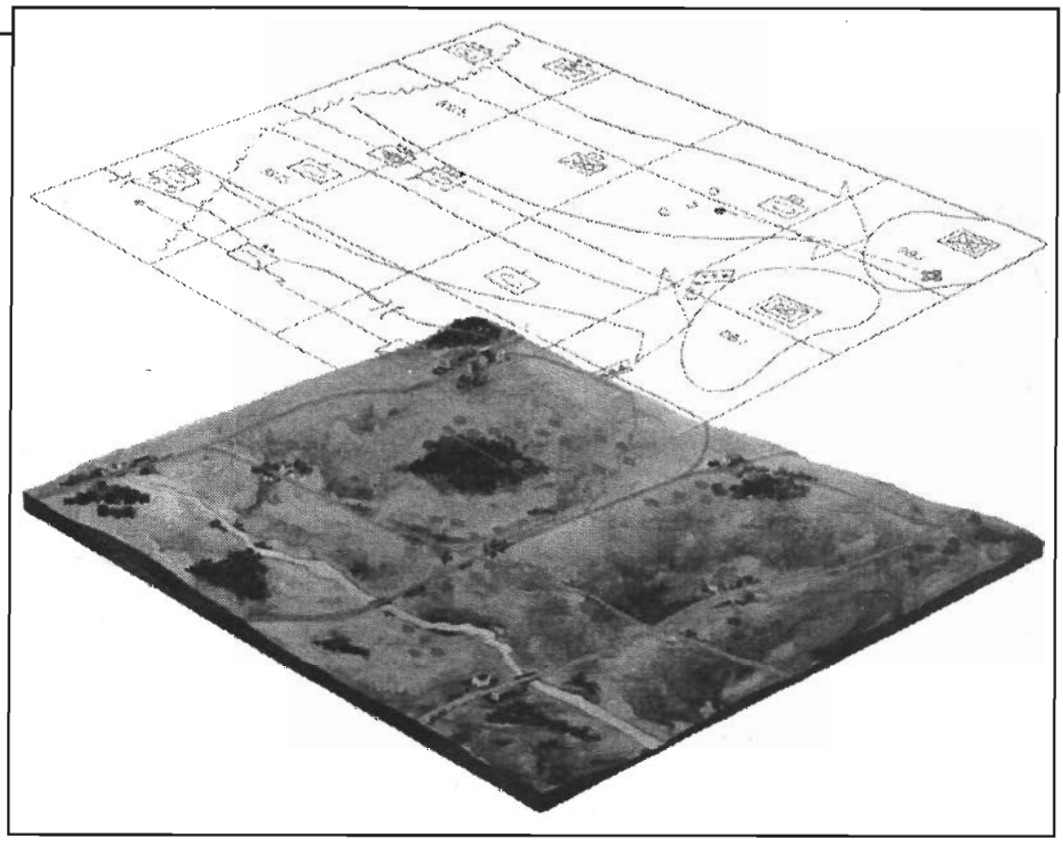
Instead of long, drawn-out reports (operational and administrative/logistical) being transmitted via FM radio, the digitization process will reduce transmissions to short bursts and prevent the enemy from locating friendly positions with their direction finding systems. Commanders also will discover they have a much better idea of their unit's status.

The automatic dissemination of information will allow leaders more troop leading time. Instead of going to a Tactical Operations Center (TOC) with acetate and alcohol pen in hand and waiting for hours for the operations order (OPORD) to be issued, the order and graphics can be transmitted electronically. Leaders will spend more time leading.

This description of the future does not imply that digitization is a panacea. Digitization will not win wars. Well-trained soldiers and leaders will continue to win wars, but digitization will greatly assist in fighting and winning. Early thinking on this revolution in technology focuses on examining the training potential. Digitization represents at least four training challenges: the balance of voice to digital transmissions; our enhanced ability to develop and capture changes in tactics, techniques, and procedures; our ability to integrate digitization into planning, preparation, and consolidation; and finally, the impact of digitization on our use of terrain. We will explore briefly each of these domains.

Until now, with the exception of the artillery community, all maneuver and support arms have used voice as the primary means to communicate. As we enter this new era of the electron, burst transmission, and dynamic computer screens, what balance do we want between voice and "a beep and a rush?" The solution to this challenge will demand the best tactical and training talent we have. There is some degree of comfort, especially during high stress conditions, that comes from hearing a human voice. What data and information do we need to move by digital burst versus human voice? Tactical and training professionals must consider and decide on these matters. We must begin now to shape this balance and build any needed redundancy into our systems. Our first experiences at NTC indicate that voice must always take priority; however, we may need to build a backup digital capability to transmit the same data. For example, perhaps the contact report should be both voice and digital compatible. The leader can use the tactical situation to determine the most appropriate communication medium.

The advent of digitization promises a dramatic surge in our ability to develop tactics, techniques, and procedures. Historically, we have written these sorts of bread and butter battlefield considerations into bulky manuals (1000+ pages in FM 71-123). Training soldiers and leaders to manage and use this bulk of information is difficult. Perhaps digitization will give us the ability to catalog core techniques and build them into an onboard



computer. The ability to develop logic programs and train our bright leaders to use this sophisticated approach may magnify our effect and prove to be the next significant enhancement to our combat potential. Possibly it will be as dramatic as the introduction of thermal imagery has been in opening the night to combat operations. These logic- and menu-driven tactics, techniques, and procedures (TTP) will demand tremendous thought by bright officers and NCOs. We can't have the weak of heart or the inexperienced performing the critical task of deciding how to include enhanced TTP management into the digitized battlefield. We must have a direct link from software writers to trainers, and finally to operators. We must also listen to our talented crews and leaders. They have the real answers.

As observer-controllers at our Combat Training Center examine the parameters of digitization, we begin to see tremendous potential for the technology as a tool to enlarge and enhance our ability to plan and prepare for the battlefield. While we are developing digitization to enhance battle synchronization (lethality, survivability, battlefield tempo), we believe that we may experience more effect from digitization as a tool to get to and from the battlefield. Our ability to control the tempo of battle is limited by our requirement to plan and prepare. Many of us have spent tens of hours preparing for one violent hour of combat. If digitization has the power to reduce the planning time, then we will achieve the ability to cycle faster onto the enemy force and become even more precise in considering when and where we strike.

An example might be the ability to electronically construct offensive and defensive engagement areas in a matter of minutes, as opposed to the hours we take using today's techniques.

Perhaps the most dramatic impact of digitization on training will be our ability to use terrain and weather that have historically been unsuitable for mounted operation. Consider intentionally embedding a force in multispectral and artillery-delivered smoke or fog. We could move in this condition as a means to deceive or protect a force. Convention dictates that we not put mechanized forces into broken ground. However, on the digitized battlefield, we will be able to predict the all-important terrain intervisibility lines, mass our combat power, and approach the enemy from the least expected direction — probably over broken ground.

A final observation deserves serious consideration. In order to transition to a digital battlefield, we will need to achieve a new level of discipline. Our initial experiences indicate that, in order to remain "digitally" connected across the battlefield, we must become much more precise. At NTC, the observer-controllers likened this requirement to our experiences with the KY-57 secured device. Remember the challenge we had in the mid-1980s, when we had to learn to discipline our communication system to provide the correct fill for this secure communication system? The digital battlefield, with its associated requirement to 'remained linked' (the new term), will demand an even higher level of attention to detail. Our soldiers will once again prove themselves able to meet this challenge.

Our first experience with digitization was dramatic. Imagine night live fire in the famous Drinkwater Valley. Instead of the familiar voice fire commands, all one hears is a split-second beep and 14 combat systems erupt in volley fire. We were impressed!

Digitization will require new levels of discipline and adjustment. However, we seem to be on the verge of a significant increase in combat potential. We must have the best and brightest shaping this future. Our Combat Training Centers will play an important role in helping to train the force to explore new and innovative tactics, techniques, and procedures. We are on the edge of a new and exciting era.

Together Into the Breach

by Lieutenant Colonel Russell W. Glenn

(This article is reprinted from the December 1992 issue of *The Royal Engineer Journal*)

"Armor is more than a branch. It is a state of mind whereby a balanced team of arms and services works together in a climate of equal importance and equal prestige."[1]

Attributed to General Adna Chaffee

Such was the combat philosophy of the great armor innovator, as cited by Lewis Sorley in *Thunderbolt,* his biography of General Creighton Abrams. Sorley further states that his philosophy was internalized by the 4th Armored Division's "P" Wood, by Bruce Clarke, and by Abrams himself during and after World War II. But what happens if one of the team members lacks versatility and other characteristics needed in combat?

The June 1993 version of Field Manual 100-5, *Operations,* states that success during operations depends on the ability to operate in accordance with five basic tenets:

Agility: The ability of friendly forces to act faster than the enemy.

Initiative: The ability to set or change the terms of battle by action.

Depth: The extension of operations in space, time, purpose, and resources.

Synchronization: The ability to arrange battlefield resources and activities in time and space to produce mass and combat power at the decisive point.

Versatility: The ability of units to meet diverse mission requirements.[2]

U.S. Army heavy divisions, with only one organic engineer battalion, had problems meeting the demands of these tenets, particularly the newly added tenet of versatility. Their limited numbers meant engineer squads and platoons quickly became overtasked when trying to meet the mobility, countermobility, and survivability needs of their maneuver counterparts. The divisional battalion (see Figure 1) consisted of four line companies, a bridge company, and a headquarters company. One line company generally supported each of the three maneuver brigades normally found in a division (Figure 2). The fourth line company often supported the divisional cavalry squadron. An engineer battalion commander was both the commander of his unit and the primary engineer advisor to the division commanding general.

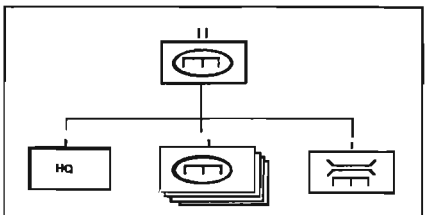


Figure 1. Division Engineer Battalion Before Restructuring

During World War II, the demands of combat typically required augmentation of this single engineer battalion. A corps would then provide one or more additional battalions from its assets. An engineer brigade-level headquarters sometimes accompanied these additional units to manage the resultant large number of engineers. Often, however, the additional battalions came without this higher headquarters; the divisional battalion commander's span of control became rather unwieldy. Engineer units on General Chaffee's combined arms team were not optimally designed for combat operations.

Post-war studies of engineer support concluded that the divisional engineer structure was inadequate. The organic complement of engineer troops was seldom sufficient to ensure mission accomplishment; continuous augmentation was necessary.[3] Unfortunately, the resulting recommendation for creation of a divisional engineer regiment of three battalions was discarded during post-war force reductions and in the development of doctrine for a nuclear weapons-dominated battlefield.

WWII's engineer problems became apparent once again on the exercise plains of Germany and during mock combat in the desert of the National Training Center (NTC). Engineers were not keeping pace with mechanized infantrymen and tankers. They were well trained, but their low numbers and overstretched command structure precluded successful support of maneuver forces. Something needed to change; maneuver commanders had to quickly have sufficient engineers at

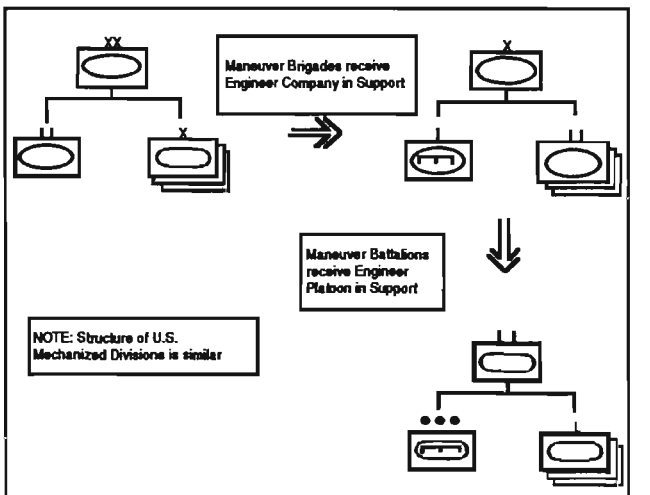


Figure 2. Engineer Support to armored and mechanized divisions before restructuring.

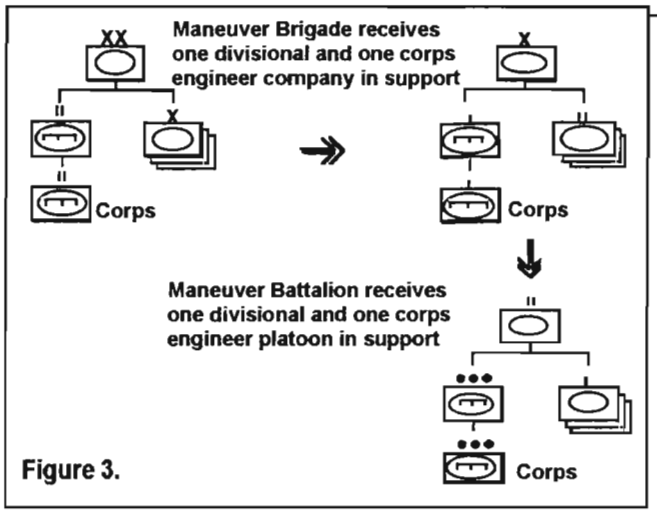


Figure 3.

the critical location on the battlefield if they were to be both agile and versatile enough to gain and maintain the initiative critical to victory.

Changes in the engineer structure were necessary to ensure effective battlefield support. The shortcomings which precluded the engineer force from matching its infantry and armor counterparts in combat agility and versatility fell into the categories of quantity, command and control, and synchronization.

Quantity: There simply were insufficient divisional engineer units to provide the support needed. For example, a brigade conducting breach operations should have a minimum of one lane per task force through any minefield encountered during an attack. Much preferred are two or more per task force. Thus, a brigade attacking with two task forces forward requires at least two lanes, and preferably has four. Even when the division has corps engineer battalion augmentation, only two engineer platoons support each task force (see Figure 3). These platoons suffer attrition and their speed of execution is degraded as they encounter obstacles in depth. The division or brigade commander can compensate by task organizing to provide greater support where it is needed. The resultant cost of weighting the main effort is loss of engineer support elsewhere. If engineers are forward supporting a breaching effort, the combined arms force subsequently assaulting through these breaches is short or devoid of engineers. Assault force commanders are subsequently handicapped when encountering further obstacles in depth or are otherwise in need of engineer support. The apparent solution is that they pick up engineers as they move through the breach ("task organizing on the move"). The experienced leader cringes at the thought. Engineer units attempting such a reorganization must consolidate (perhaps under fire), link up with the assault element and execute all coordination and reorganization necessary to provide effective support to their new unit while attacking. Engineers quickly become exhausted as they are passed from unit to unit in support of continuous operations. Reorganization also takes time, again degrading the agility of the maneuver commander and impacting on his efforts to seize and retain the initiative as he conducts offensive operations. American commanders found that reorganization on the move was not effective in demanding training environments. The engineer structure simply lacked the versatility needed in combat.

Command and Control: Compounding the problem of an insufficient number of units was the related issue of engineer leadership at each level. Platoon leaders were engineer advisors to task force commanders. These second lieutenants frequently lacked the experience necessary to maximize the potential of their asset on the combined arms team. The second lieutenant also suffered the same dual demands on his time as did his battalion commander. Both were leaders of their units and primary engineer advisors to a maneuver headquarters. Their command structures were barely versatile enough for these two tasks. They quickly became overburdened with any addition of augmenting engineer units. A divisional battalion commander could be commanding his battalion, advising the division commander, and coordinating the assets of one or more augmenting engineer units. Synchronizing the engineer effort with other combined arms team operations became very difficult.

Synchronization: This ability to fully synchronize the engineer force with other elements of the combined arms team was not due simply to an inadequate command and control structure. A post-war investigating board reviewing World War II divisional engineer support concluded that:

> *"Organic battalions provided better teamwork with other elements of the division than strange supporting battalions. One of the greatest assets of any team of combined arms in a joint action... is confidence in one another, a familiarity with the limitations and capabilities of one another. With the organic engineers in the division, this necessary teamwork, confidence and knowledge of personalities was soon developed; with the everchanging, strange supporting engineers, it was not."*[4]

This comment applied to post-war operations as well. Combined arms operations with divisional engineers generally were well synchronized. The same could not always be said for operations with augmenting engineer units. These units were of the same quality as their divisional counterparts, so why did they not perform as well on the field of battle?

The reason was habitual relationships. Divisional engineer companies supported the same brigade whenever possible. Their platoons were assigned to the same task force when feasible. Each trained with the same unit they would accompany in war. Engineer leaders, radiomen, and equipment operators knew the standing operating procedures of the unit supported. They knew their maneuver counterparts' personalities and therefore better understood their intentions. Often, the augmenting corps engineer units could not achieve this relationship. They were frequently at garrison locations remote from the division or suffered demands which precluded their supporting divisional exercises. Maneuver commanders found them slow

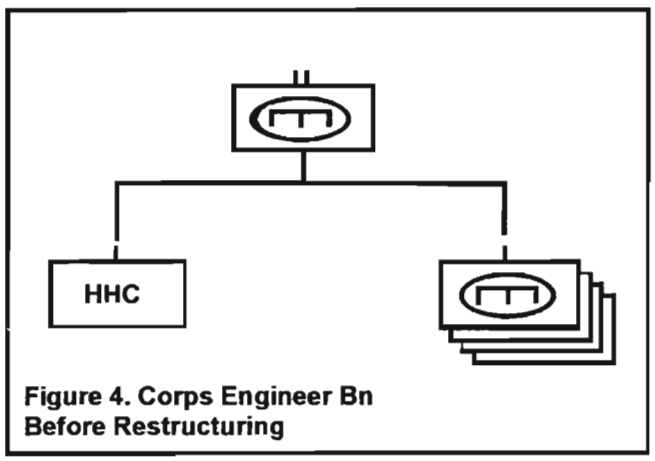


Figure 4. Corps Engineer Bn Before Restructuring

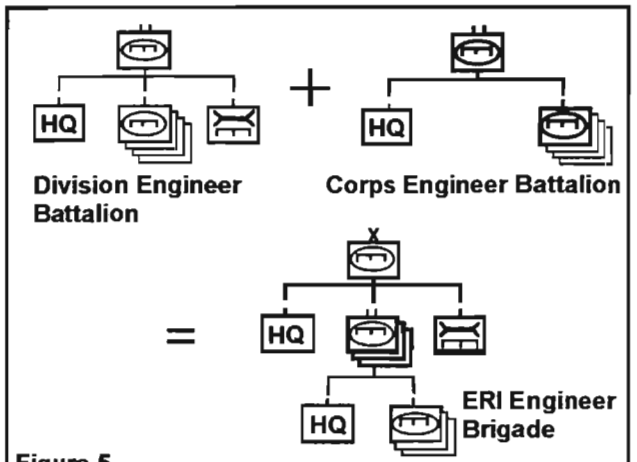


Figure 5.

to respond at critical times; corps engineers simply could not know the intentions of these commanders as well as those who always trained with them.

Balancing the Team

A new engineer structure was needed to enhance agility and versatility. Maneuver commanders needed a potent engineer capability available on short notice. Equally as important, they needed an engineer command structure which could plan for future operations to ensure engineers were in the right place when needed. This combination of versatility and enhanced control would provide the means to synchronize engineer operations with the rest of the combined arms team. The solution had been proposed 40 years before. Mechanized and armored divisions needed not one engineer battalion, but rather an engineer command with three battalions and a commander and staff to manage this vital battlefield asset.

The result is the Engineer Restructure Initiative (ERI). Neither the dollars nor the manpower are available to simply add more engineer battalions to the army, but a solution is available by remodelling the "normal" support a division would receive in combat (its organic battalion plus one additional battalion from corps). Corps and divisional battalions are structurally very similar; the major difference is that corps battalions lack a bridge company (see Figure 4). By reorganizing these two battalions of four line companies each and creating three battalions of three line companies each, a division has an organic engineer battalion to support each of its three maneuver brigades. The companies are smaller so as to provide the manpower for a brigade headquarters, an additional battalion headquarters, and the ninth engineer company (two battalions of four companies each gives only eight of the nine companies needed for three battalions of three companies each. See Figure 5). The ERI brigade is achieved without an increase in the number of engineer personnel supporting a division. The combined strength of the pre-restructuring divisional and corps battalions was 1,719 men. The ERI brigade total strength is 1,354 personnel. The triangular nature of the ERI structure makes sense as most U.S. divisions have three brigades. Thus the one-to-one habitual relationship that aids agility and synchronization on the field of battle is achievable in training and war. Looking at the ERI structure with regard to the shortcomings of the previous (one divisional engineer battalion) structure:

Quantity: It was not the number of personnel so much as it was the number of units that precluded versatility. ERI divisional engineer battalions are much smaller (433 versus 899 men), but the task force commander who previously had to breach an obstacle system with a platoon of 30 engineers now has a company of 103 men. Sustained operations are feasible without excessive reorganization on the move. The engineer company also comes with greater equipment capability. Whereas the platoon of old had only two Armored Combat Earthmovers (ACE, similar to an armored bulldozer) for breaching, the ERI company includes four AVLBs, four Mine Clearing Line Charges (MICLIC), two Combat Engineer Vehicles (CEVs) and seven ACES. Responsiveness has been significantly upgraded with this positioning of more engineer assets closer to the line of contact. Engineer versatility is greatly enhanced due to the reduced need for frequent movements of engineer units from one maneuver unit to another.

Command and Control: Not only are more engineers forward, maneuver commanders have the additional benefit of more experienced commanders as their primary advisors. The task force commander has a captain supporting his headquarters, the brigade commander a lieutenant colonel battalion commander. The division commander is better served as he is now advised by a colonel and his staff. The division has an engineer command and control structure responsive to its needs as it seizes the initiative and operates throughout the depth of the battlefield.

Synchronization: Maneuver commanders still have the units training with them in peace that will accompany them to war, but now maneuver commanders have a larger unit habitually supporting them. The brigade commander deploying to war will be supported by the same engineer battalion that supported him during the months of training before deployment. These habitual relationships are disrupted as missions demand, but are maintained when possible. The payoff in synchronization, and thus increased

battlefield agility and initiative, is indisputable.

The Army engineer community has already begun its transition under ERI. Two additional battalions and a brigade headquarters augmented Gulf War mechanized and armored divisions to obtain the benefits of a greater number of engineer units and more experienced command and control. Pre-combat training in the desert established habitual relationships between these battalions and their maneuver counterparts. ERI engineers proved themselves better able to synchronize large engineer forces.

The response from DESERT STORM division commanders was unanimous: keep the ERI structure. The army did so. All mechanized and tank divisions will have a brigade of engineers by the end of 1995.

Notes

[1]Sorley, Lewis, *Thunderbolt: From the Battle of the Bulge to Vietnam and Beyond: General Creighton Abrams and the Army of His Times,* N.Y., Simon & Schuster, 1992, p. 36.

[2]Department of the Army, *Operations.* Field Manual 100-5, Washington, D.C., U.S. Government Printing Office, 14 June 1993.

[3]William A. Carter, *Employment and Staff Procedures of Engineers with Division, Corps, and Army,* United States Army, First Army, 1945, p. 10.

[4]U.S. Army, *The General Board: Study No. 71: Engineer Organization,* U.S. Forces, European Theater, 1945, p.19.

Lieutenant Colonel Russell W. Glenn graduated from the United States Military Academy in 1975 with a commission in the Corps of Engineers. He has served in Virginia, Kansas, the Republic of Korea, California, New York, Germany, and the United Kingdom. During the Gulf War, he was Chief, G3 Plans and Exercises for the Third (U.S.) Armored Division. He is a graduate of the United States Army Command and General Staff College and the School of Advanced Military Studies. He is currently a fellow at the RAND Arroyo Center.

Green To Gold — Future Officers From Today's Enlisted Ranks

by Captain Greg Lane, Army ROTC Dept., Austin Peay State University

In its constant search for quality officers, the Army taps its enlisted ranks to find good soldiers with potential. These soldiers have three possible routes to gain a commission: OCS at Fort Benning, the U.S. Military Academy, or the Army Reserve Officers Training Corps offered at approximately 300 colleges. As an ROTC instructor, my article will focus on the ROTC option.

Green to Gold, the Army ROTC program, offers soldiers on active duty an early discharge to earn a bachelor's degree and a commission. Armor and cavalry soldiers make excellent Green to Gold candidates. With a good grasp of basic soldier skills, familiarity with operations orders, and solid GT scores, many 19-series soldiers can adapt with minimal difficulty to Army ROTC and its emphasis on small unit skills and basic soldier knowledge. For those soldiers with good high school records and/or some college credit already earned, they may meet the qualifications for Green to Gold.

Green to Gold offers two options, scholarship and nonscholarship. To qualify for the scholarship option, a soldier must meet the following criteria:

Candidates for a **4-year** Green to Gold scholarship (anyone with less than one year of college) must have an SAT score of at least 850 or an ACT score of at least 19; be accepted by an historically black college or university offering Army ROTC; be accepted by the Army ROTC department at that school; have at least two years of active duty when discharged to start college; be recommended by both the company and battalion commanders; be no older than 26 at graduation with two years of active duty, 27 with three years of active duty, or 28 with four or more years of active duty; and pass a medical examination.

Candidates for **2- and 3-year** Green to Gold scholarships must have a GT score of 115 or higher; a college grade point average (GPA) of 2.5 or higher; be accepted by any school offering Army ROTC and by the ARMY ROTC department at that school; and have at least two years of active duty when discharged to start college. Recommendations, age requirements, and medical exam are the same as for a 4-year scholarship.

To qualify for the nonscholarship option, a soldier must have completed two years of college; have a GT score of 110 or higher; a college GPA of 2.0 or higher; be accepted by any school offering Army ROTC and by the Army ROTC department at that school; have at least two years of active duty when discharged to start college; be recommended by the company commander; be no older than 29 at graduation (waiverable to 32); and pass a medical exam.

The **scholarship** benefits are: Tuition completely paid, up to $8,000 per school year (if tuition is higher than $8,000 the Army pays $8,000 or 80 per cent of tuition, whichever is greater; a book allowance of $225 per semester or $150 per quarter; and a monthly subsistence allowance of $100 during the school year. The **nonscholarship** benefits are: A monthly subsistence allowance of $100 during the school year and the opportunity to simultaneously serve in a National Guard or Army Reserve unit while a cadet, drawing E5 pay as per time in service (This option is not available to scholarship cadets.)

Soldiers can draw their veterans benefits while in Army ROTC if they have served the minimum time to qualify. To qualify for the Montgomery GI Bill, a soldier has to serve at least 30 months of a three-year or longer enlistment. If the soldier has the Army College Fund as well, he qualifies for that money; however, the Fund money is pro-rated to the percentage of his enlistment he has served.

If a soldier wants a scholarship and is qualified, what are his or her chances? In the last five years (FY89-FY93), a soldier's chances have been excellent. In four of those years (FY90 being the exception) every soldier applying who was qualified got a scholarship. So, if a soldier is qualified, have that soldier apply! The service obligation is eight years after commissioning. This time can be served on active duty (if selected), or in the Army Reserve or National Guard. Historically, about half of ROTC graduates go on active duty.

Though my experience is limited to being Fort Campbell's Green to Gold representative and in Austin Peay State University's (APSU) Army ROTC department, I have seen great success in this program. Our Green to Gold cadets at Austin Peay do very well. (One, CPT Lance Richardson, was the top cadet in the nation in 1989!) They provide maturity and a breadth of experience to our ROTC program and helped us become the top rated medium size Army ROTC program in the nation in 1990. Of particular note are cadets who come from the armor or cavalry units. We currently have one cadet in our junior class who came to us from the 3rd Armored Cavalry Regiment (ACR) as a former SSG scout, another junior was a SGT mortarman in 2nd ACR. Additionally, we have a sophomore cadet who was formerly in the 2nd ACR.

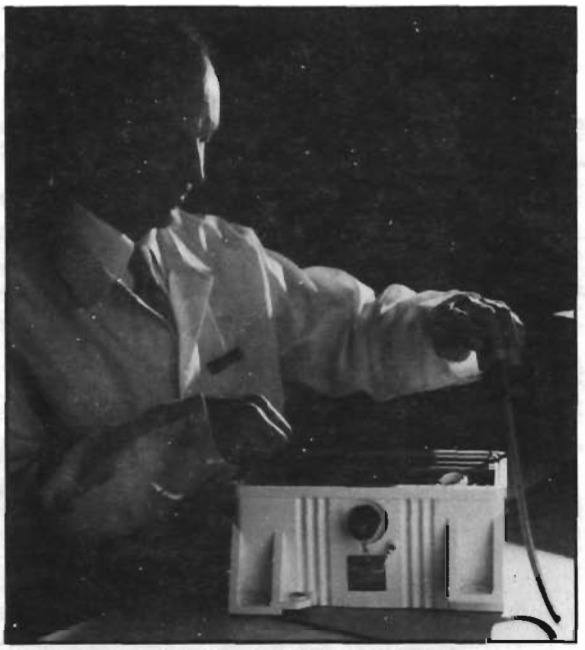
If interested, contact the Army ROTC department nearest you for further information and assistance. Each stateside installation (to include Alaska and Hawaii) have nearby Army ROTC departments responsible for Green to Gold. If you are overseas, contact your nearest education center and the Army ROTC department of your school of choice for assistance.

The Three-Dimensional Battlefield

by Jack Todd

Navigation played a key role in enabling armored units of the coalition forces to crush Saddam Hussein's vaunted "fourth largest army in the world." The lesson has not been lost on military planners around the world.

In the relatively flat, featureless, desert environment of the Persian Gulf, the satellite-based Global Positioning System (GPS) provided far greater accuracy than the traditional tools of compass and map. The resulting enhanced navigation capability facilitated rapid maneuver, and improved coordination of the allied forces tipped the scales and ensured victory.



Factory technician makes final adjustments on a POS/NAV navigation system processing unit. Unlike the satellite-dependent Global Positioning System, POS/NAV uses inertial guidance and is self-contained.

However, there should be no expectation that all the battlefields of the future will be as conducive to the use of space-based navigation assets as was the Southwest Asia desert terrain, nor can commanders of armored units count on external navigation systems to remain invulnerable to determined enemy countermeasures, physical as well as electronic.

The reality is that the battlefield is three-dimensional. In order to direct fire effectively, armored units must know not only their location on the earth's surface, but also the attitude of their vehicles relative to that surface.

To make sure that allied forces can fight and win in this environment, the armored vehicles of the future will need self-contained navigation systems to complement GPS and other external means. Other vehicles, ammunition loads, and metallic objects can make a magnetic compass useless at crucial times.

The benefits of land navigation systems go beyond the restraints of landmarks. In addition to obstacles imposed by the enemy, the tank commander must worry about simple errors in orientation. Should a tank deviate from its prescribed course, the leader of an advance column could lead a whole unit into confusion and possible defeat.

Inertial navigation is a technique that has demonstrated its effectiveness in other military vehicles operating in three-dimensional environments. It has progressed technologically to the point where it has been accepted for installation in the U.S. Army's new M1A2 main battle tank (M1BT), which has also been ordered by the armies of Saudi Arabia and Kuwait.

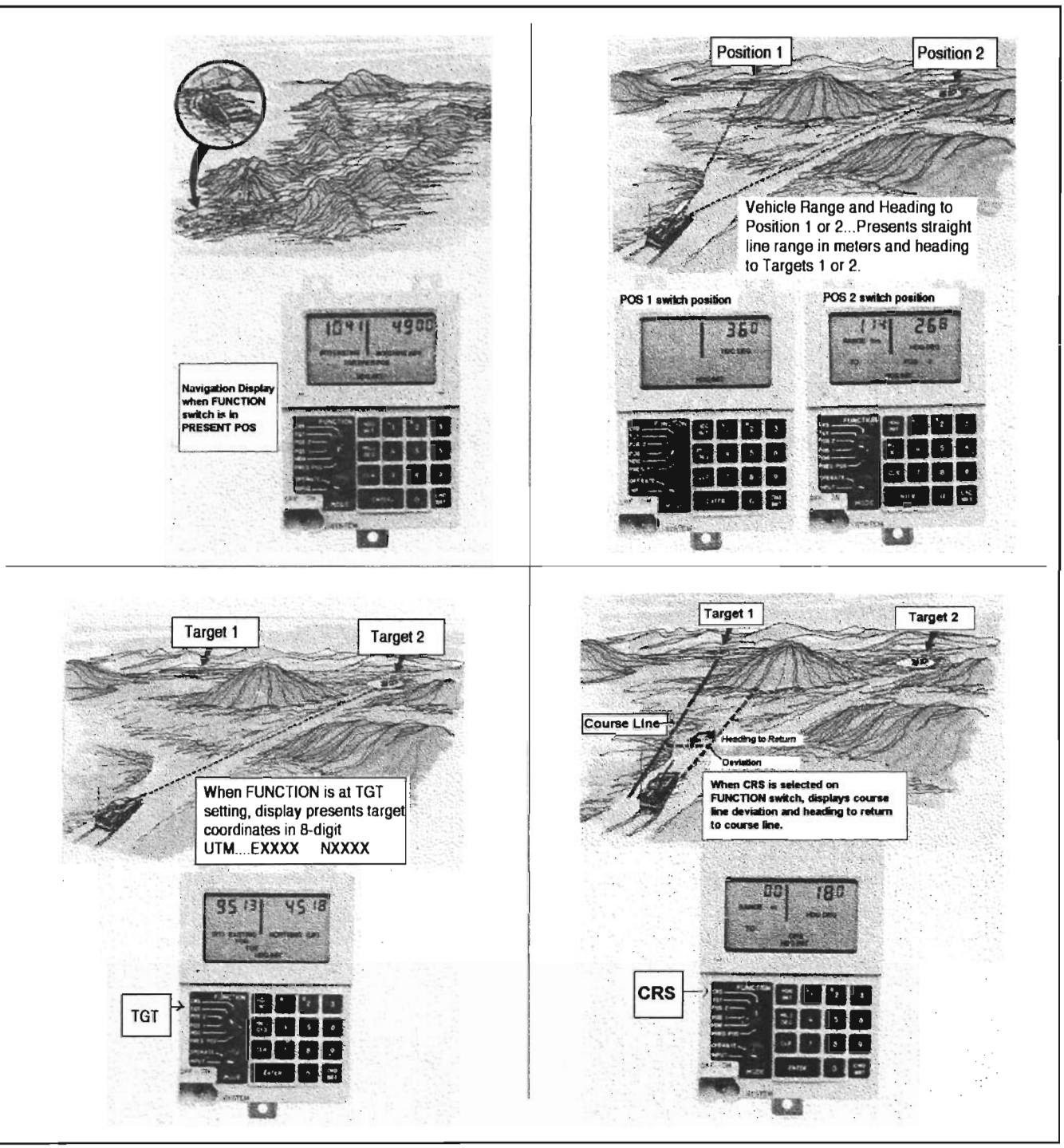
In September 1992, the Aerospace & Defense Systems Division of Smiths Industries, Grand Rapids, Michigan, began delivering production units of its most advanced military vehicular navigation system to the tank manufacturer, General Dynamics Land Systems Division.

This autonomous position/navigation (POS/NAV) system, under development since January 1989, represents more than 12 years of development and operational experience with gyroscope-based inertial navigation for military vehicles. The basic technologies of modular strapdown systems have been validated in Smiths Industries' Vehicle Navigation Aid System (VNAS, pronounced "vee-nass") used in more than 25 types of tracked and wheeled combat vehicles around the world and updated for the demanding challenges of the future.

POS/NAV uses the powerful 32-bit Motorola 68020 microprocessor and other state-of-the-art electronics, such as Application-Specific Integrated Circuits (ASICs), to control two gyroscopes providing pitch, yaw and roll axes information. The system is integrated into the M1A2 through an interface to the one-megabit per second MIL-STD-1553 data bus. All hardware is hardened to M1A2 standards, and the software is written in the DOD-mandated ADA language.

Specifically designed for the M1A2 and other main battle tanks, POS/NAV is an improvement over comparable earlier navigation systems in its ability to counter nuclear, biological and chemical (NBC) threats, as well as survive ballistic shock. The system is contained in a single box qualified to full military environmental specifications. It weighs 20 pounds and measures 6 x 7 x 12 inches. The electronics suite, within the POS/NAV chassis, has room for expansion to accommodate other features.

POS/NAV serves as a force multiplier by allowing armored formations to move rapidly toward objectives on the basis of accurate and reliable navigation data while enhancing firepower and lethality. The system provides vital information to both the tank crew and the battlefield commander. By us-



ing the Intervehicular Information System (IVIS), in combination with the single-channel ground and airborne radio system (SINCGARS), and POS/NAV, the commander can track the location of all other vehicles equipped with IVIS and POS/NAV on the Commanders Information Display (CID), thus improving control of armored formations while moving and during a battle. The M1A2 CID provides the information on a grid map showing the location of all IVIS/POS/NAV-equipped vehicles periodically and automatically updating them on the display. In addition, it can share targeting information between elements of the force to coordinate attacks.

POS/NAV allows crews to move accurately at combat speeds without stopping to read maps or orient landmarks or terrain features. Preliminary results indicate the following potential advantages over manual navigation methods: 96 percent increased accuracy in reaching checkpoints, 42 percent less time to complete road marches, 33 percent greater success in bypassing NBC threats, 12 percent less fuel expended, 10 percent less distance traveled, and 99 percent more accuracy in position reporting.

Other than a one-time alignment during initial installation, no calibra-

tion or maintenance is required for the system during normal operation. Projected Mean Time Between Failures (MTBF) is about 6000 hours.

The system operates through a vehicle reference unit that aligns itself to true north, computing vehicle heading and sensing attitude and motion. In the tank, the vehicle system odometer provides distance information to the POS/NAV. In other vehicles, a separate sensor can be used to provide distance information.

On start-up, positioning is initialized and heading is determined through gyrocompassing. Heading can either be entered manually or recalled from memory at last system close-down. The memory is nonvolatile, retaining data when the system is turned off.

Once the vehicle's start position is entered into the data system, the navigation display unit reports the vehicle's position in Military Grid Reference System (MGRS) coordinates. The system also provides grid heading in degrees. Other outputs provide information on pitch and roll angles and the vehicle's azimuth rate. Used in conjunction with the vehicle computer, POS/NAV can provide way points, target positions, and course line deviations.

POS/NAV maintains position accuracy to within 2 percent of distance traveled (20 meters per kilometer) and heading accuracy to within 1 degree per hour. The initial heading accuracy is better than 0.4 degree.

This means that, when the system is updated, POS/NAV provides superior short-term attitude and position accuracy that can be critical during engagements to complement the long-term accuracy of external means such as GPS.

Based on its performance in the Persian Gulf war, it is clear that GPS has a definite place in future tank navigation systems. However, self-contained systems like POS/NAV offer at least two advantages over satellite-based systems in other combat environments.

- Both the satellites in space and the antennas on the earth's surface can be vulnerable to enemy actions. A technologically sophisticated enemy can jam satellite transmissions, and an enemy with only minimal technological capability can disable antennas with conventional munitions.

- Navigation systems based on space assets are degraded if they must operate in areas out of assured line-of-sight to the satellites. This is a particularly difficult problem in a jungle environment, but it could also be troublesome in urban areas.

Another value is the three-dimensional accuracy of POS/NAV in offset targeting, which derives a target map position from the known position of a vehicle and the range and bearing of the target using laser rangefinders. The 3D solution takes into account that the target may be above or below the targeting vehicle and that the targeting vehicle may not be level, thus introducing targeting errors that can be substantial at ranges of 3500 meters or beyond.

In a series of 900 computer runs conducted during 1992, Smiths Industries tested a mathematical model representing a realistic battlefield scenario: vehicle hull pitch and roll limited to plus/minus 20 degrees, turret angles of plus/minus 60 degrees (based on the assumption that engagements would tend to be frontal) and targeting ranges of 2500 to 3999 meters (the current operational range limit for the M1A2 laser rangefinder) based on the premise that targeting tasks may occur at ranges greater than those for engagement.

The objective was to isolate the targeting errors contributed by the lack of attitude (pitch and roll) information without POS/NAV. The results showed an average targeting error of 64 meters and a peak targeting error of 400 meters and a more than tenfold improvement to a peak error of less than 38 meters with POS/NAV.

An additional contribution from the POS/NAV is in the targeting solution for the main gun. Steady improvements in the performance of the ammunition and basic gun system are providing the capability for longer range kills than the original design. With this longer range comes a need for improved computation for the ballistic solution for the gun. Computation that is not needed at shorter ranges becomes more important as engagement ranges increase. With full time pitch, and roll data from the POS/NAV, the fire control system in the M1A2 can provide dynamic cant correction to the firing solution. This permits "shoot on the move" engagements over uneven terrain while maintaining targeting accuracy. The combination of longer ranges and dynamic correction increases both lethality and survivability.

Enhanced lethality, in turn, provides advantages in two areas: the higher PK permits more effective use of ammunition and it improves crew survivability through increased range engagement, faster engagement times, and increased probability of first round hits.

Armored vehicle navigation systems of all types are now a fact of life for the armies of the world. The successful armies will be those that tailor these systems to serve as force multipliers in real world battlefield conditions.

Jack Todd is vice president for military development for the Aerospace & Defense Systems Division of Smiths Industries and is based at the company's office in Arlington, Virginia. He is a former Army Aviator and a graduate of the Command and General Staff College and the National War College. He has served in the military in a series of Planning Strategy Development and Weapon System Evaluation activities. He is currently an associate member of the Scientific Advisory Board. His military awards include the Silver Star Medal, the Distinguished Flying Cross with oak leaf cluster, the Air Medal (33), the Bronze Star Medal, and the Defense Meritorious Service Medal.

Future Thrusts

The former Chief of Armor's guidance to the Mounted Warfighting Battlespace Laboratory for future thrusts regarding reconnaissance and security, the cavalry scout, and cavalry regiments and squadrons.

by Lieutenant General Paul E. Funk

PURPOSE: This White Paper provides the Chief of Armor's guidance to the Mounted Warfighting Battlespace Laboratory for future thrusts regarding reconnaissance and security, the cavalry scout, and cavalry regiments and squadrons. The intent is to better focus the exploratory process required for preparing for 21st century war in a timely and evolutionary manner. All must be accomplished within a constrained force structure with limited fiscal outlays for RDA.

BACKGROUND: The national military strategy of power projection, the technology advances adaptable to warfighting, and the increasing proliferation of weapons of mass destruction and modern warfighting materiel have profound implications for the U.S. Army and the mounted force. A smaller force that mirrors the current structure is not the answer. The wide variance in the potential threats to U.S. national interests will require a capabilities-based force. The mounted force must fine-tune structure by integrating technology that will enhance warfighting capabilities and provide the best return on the investment.

FM 100-5, *Army Operations* (1993), provides the Army guidance for preparing for 21st century war. The emphasis placed on reconnaissance and security and the economy-of-force principle makes cavalry and the cavalry scout suitable focal points for commencing the process.

RECONNAISSANCE: Reconnaissance is a focused information collection effort to reduce the unknowns concerning the enemy and terrain. It is conducted prior to, as well as during, all combat and/or combat-related operations to provide the near-real-time information required for the planning and decision process and to preclude surprise. In cavalry reconnaissance operations, information is acquired by scouts and immediately reported. Elapsed time from the acquisition of the information by a platoon to receipt should be not more than two to five minutes for a battalion/squadron/brigade commander and not more than two to ten minutes for a division/corps commander. The purpose of reconnaissance will be to reduce the unknowns of battlespace by gathering information upon which tactical and operational level commanders may base plans, decisions, and orders. Reconnaissance will require the capability to maintain continuous surveillance, visually and electronically, to SEE the battlespace and the enemy under all conditions. The intent will be to preclude a friendly force entering battle unwarned, improperly deployed, or with its maneuver combat striking power dissipated for reconnaissance and security. Equally important, reconnaissance, by reducing unknowns and providing near-real-time information as it is obtained, will help ensure the best use of decisive combat power. Analysis of National Training Center data shows that 90 percent of successful combat operations are based on successful reconnaissance. Reconnaissance is, and will continue to be, an essential prelude to and a part of all combat operations. Reconnaissance must be conducted at the distance required and focused on a specific objective to provide the information desired. Reconnaissance will require mounted, dismounted and, frequently, a combination of mounted and dismounted action. When possible, air and ground cavalry should be employed together to capitalize on the strong points of each to most rapidly expand battlespace, develop a situation, and increase operational tempo.

The three types of reconnaissance missions — route, zone, and area — will remain viable. Route reconnaissance will often be required to obtain detailed information of a specific route and all adjacent terrain from which movement along that route could be influenced. Route reconnaissance will be oriented on either a road or a general direction of advance. Route reconnaissance may be conducted as a prelude to movement of a friendly force. Occasionally in the future, when the situation is fluid, the purpose may be to obtain information of an enemy force moving along a specific route or to locate sites to impede enemy movement. Zone reconnaissance will be conducted to obtain detailed information of all routes, obstacles, terrain, and enemy forces within a zone defined by boundaries. Area reconnaissance will be conducted when information of a specific area is desired. Generally an area reconnaissance is conducted the same as a zone reconnaissance. The primary differences will be movement to and from the area of interest, which involves bypassing enemy and obstacles enroute and avoiding enemy outside the area of interest.

SECURITY: Whereas the purpose of reconnaissance will be to reduce the unknown and provide near-real-time information concerning the enemy and the battlespace and/or to develop the situation, the purpose of security operations will be to do that and provide a force early warning and thus some reaction time (screen) or, reaction time and maneuver space in addition to early warning (guard, cover). *All security operations will require reconnaissance and continuous surveillance by visual and electronic means.*

A security force must deploy and operate at the distance from the secured force required for mission accomplishment. Its orientation is on the force being secured, whereas, a reconnaissance force is oriented on the reconnaissance objective. If the secured force moves, the security force must also

move. In general, the three types of security missions — screening, guard, cover — will remain viable.

The purpose of a screen operation will be to provide early warning, impede and harass the enemy with indirect and standoff firepower, and to destroy enemy reconnaissance elements within its capability. *Reconnaissance and continuous surveillance by visual and electronic means are the central functions around which all other activities revolve.* Screening operations should be viewed as defensive in nature. They will be conducted to the front, flank, or rear of a stationary force but only to the flanks or rear of a moving force. In the future, screening operations may frequently be required during initial entry operations when few troops are available. Once visual and electronic contact with the enemy is gained, it must be maintained to preclude the force being surprised and/or observed. A screen should not be expected to do much beyond providing early warning and impeding and harassing the enemy with indirect fires if the commander so desires.

The purpose of guard operations will be to prevent enemy observation of, and direct fire against, a force. They will normally be conducted within range of divisional artillery. Guard operations will be offensive or defensive in nature. They may be conducted to the front, flank, or rear of a moving or stationary force. A guard force must accomplish all functions of a screen, plus fight as required to accomplish the mission and ensure more reaction time plus some maneuver space. *As in a screen operation, reconnaissance and continuous surveillance by visual and electronic means are the central functions around which all other activities revolve.*

The purpose of a covering operation will be to develop the situation early, and to deceive, disorganize, and destroy enemy forces at a considerable distance from the force being secured. In the future, this may involve distances of a hundred-plus kilometers. A covering force must be tactically and logistically capable of prolonged independent operations and capable of fighting very hard for mission accomplishment. Covering operations may be conducted to the front, flank, or rear or a moving or stationary force and may be offensive or defensive in nature. A covering force must accomplish all functions of a screen and guard and be capable of accepting decisive engagement to provide the desired reaction time and maneuver space. *As in screen and guard operations, reconnaissance and continuous surveillance by visual and electronic means are the central function around which other activities revolve.*

CAVALRY: *FM 100-5: The basic missions of cavalry units are reconnaissance and security.... The ability of cavalry units to find the enemy, to develop the situation, and to provide the commander with reaction time and security also makes them ideal for operating in an economy-of-force role....*

Cavalry regiments and squadrons must continue to be uniquely organized, trained, and equipped units designed to conduct reconnaissance and security missions for corps and divisions and to attack, defend, and delay in an economy-of-force role. *The central functions of reconnaissance and security operations and the basic requirements for economy-of-force roles are reconnaissance and continuous visual and electronic surveillance.* This requires uniquely trained and equipped soldiers expert in mounted and dismounted reconnaissance and security activities. Thus, cavalry scouts are the heart and soul of cavalry around which activities of their parent unit revolve. The same cavalry scout is the reconnaissance specialist, "the eyes and ears" of maneuver battalions and brigades.

THE CAVALRY SCOUT: Cavalry scouts must be carefully selected, conditioned physically and mentally, and uniquely trained and equipped for 21st century war. This will be a prerequisite so that the Army can best capitalize on the economy-of-force principle during structuring of the force and execution of the power projection strategy and combat operations. In general, cavalry scouts will be organized as platoons in cavalry units or in maneuver battalions and brigades. Although all cavalry scout platoons will be basically identical, their employment will differ significantly because of their parent unit's structure and needs. Cavalry unit structure and doctrine will be oriented on supporting and facilitating activities of the organic cavalry scouts. The purpose of cavalry scout platoons organic to maneuver battalions and brigades will be to facilitate activities of their parent unit by conducting reconnaissance and screening to provide early warning. All cavalry scouts must be expert in reconnaissance and security operations and trained to capitalize on stealth to avoid decisive engagement. All cavalry scouts must be expert in the use of all organic weapons while mounted or dismounted; employment of close air support and indirect fires of all types, to include NLOS; use of demolitions to create and reduce hasty obstacles; communications, navigation mounted and dismounted; identification of all battlefield systems; use of advanced sensors and electronics to include the Long Range Advanced Scout Surveillance System (LRAS^3); and other detection, ranging, and targeting aids. All cavalry scouts must be imbued with the spirit and élan of the cavalry and mentally and physically suited/conditioned for prolonged, highly stressful independent operations depending in large measure on stealth and cunning for survival. The 21st century cavalry scout must be expert regarding all mounted scout crew stations and related functions and in the use of standoff and indirect fire for reconnaissance by fire. Cavalry scouts must be exceptionally knowledgeable of all facets of reconnaissance and security tactics and techniques. All cavalry scouts must be expert in the selection of routes and/or axis of movement for all different type units and equipment and the classification of bridges. Additionally, scouts should be expert in traffic control. In the future, more emphasis must be placed on terrain reconnaissance and the use of brigade and battalion cavalry scouts to guide or direct friendly forces to the enemy. National Training Center data shows that the current tendency in battalions is to focus scouts on target acquisition at the expense of other reconnaissance objectives. Interestingly, this data also shows that battalion scouts are used for terrain reconnaissance less than 20 percent of the time and that the battalions achieve overall mission success only about 20 percent of the time. Thus, the associated training task for the future is to train maneuver battalion/brigade commanders and staff officers in how to get the best return on their cavalry scout platoons. Concurrently, we must focus on all scout tasks equally and move away from the current trend to focus on the easy to evaluate tasks performed by other mounted soldiers, such as gunnery. The training given to a very few specifically selected scouts, in pursuit of the Cavalry Cup and the Boeselager competition, must be the standard for all cavalry scouts.

Scout NCOs must be thoroughly knowledgeable of armor, mechanized infantry, airmobile, and light infantry operations

and thoroughly trained in rapid strategic deployment requirements by air and sea.

Scout NCOs should also be expert in liaison, chemical detection, and radiological survey monitoring operations. Scout NCOs must be capable of explaining what their reconnaissance unit/team is doing and why. They must also be capable of providing information as to the capabilities of their unit/team. Scout NCOs must also be able to pass on to their commander or other entities the desires, concerns, and intent of other commanders.

FUTURE THRUSTS FOR CAVALRY UNITS AND CAVALRY SCOUTS: Rapid power projection from CONUS and forward bases will require that the organizational structure and training of cavalry regiments, squadrons, and maneuver battalion/brigade cavalry scout platoons facilitate the rapid no-notice formation of capability-based force packages. The required flexibility is inherent in the current structures but must be fine-tuned through training, experience, and doctrinal refinements. In the future, a CINC may desire cavalry scouts early on in a contingency operation for far-ranging reconnaissance but may lack the strategic deployment means for moving them and their parent organizations concurrently. Thus, all cavalry scout platoons must be adaptable for rapid force packaging and deployment. In general, the scout platoons will adapt very well. The problem will be in the administrative/logistical support tail. Once we have determined the specifics, we can probably deal with this challenge, in large measure through institutional instruction and frequent practice in the field. We should emphasize more training in tailoring cavalry units to provide for grouping like things (e.g., tanks, mortars, scouts, artillery, and air assets) in specific packages. These "specific packages" would be formed for specific combat situations and to facilitate deployment in order of most urgent need. It would also facilitate deployment of a capabilities-based contingency force.

The increased distances away from the main force at which cavalry regiments and squadrons will operate, and the fluid nature of cavalry operations in different theaters, will place unique requirements on cavalry organizations. They will require extended self-sustainment. Cavalry will also require longer range communications, both externally and internally, to ensure adequate command and control and the capability to pass information over extended distances. Cavalry scouts urgently require a reconnaissance platform that emphasizes stealth and that will facilitate their reconnaissance and security activities on the 21st century battlefield.

Cavalry regimental and squadron organizational structure must continue to be based on a combined arms approach through a combination of assigned, attached, and OPCON arrangements. We must evaluate the dismount requirement. Cavalry regiments or squadrons, which may be deployed to close terrain such as Bosnia, may require a greater dismount capability than they currently possess. In view of national interests, and probable frequency of employment in close terrain and/or urban areas, should such a capability be organic, or simply attached or OPCONed as the need arises?

In the early 1980s, one-third of the reconnaissance and security power of cavalry regiments and squadrons was stripped away to form the divisional MI battalions. Since then, experience gained in extensive maneuver exercises and in war shows that the promised return on investment was not realistic. In view of declining force structure, it is probably time to address the issue and redistribute some of the MI battalion assets and spaces to the cavalry structure, to elements of the divisional staffs, and to the maneuver brigades. This will increase efficiency, simplify coordination, reduce time lags, and eliminate unnecessary structure.

TRADOC and HQDA actions to restore tanks and a significant ground scout capability to the divisional cavalry squadrons are of great significance to the tactical and operational health of the force. The divisional cavalry squadrons with three ground troops and two air cavalry troops will provide for the routine integration of air and ground cavalry operations required to rapidly expand battlespace and operational tempo. Therefore, we must quickly develop digital common links between air and ground for present as well as future equipment. From time to time, a thought appears that air cavalry can do everything that ground cavalry can do. That simply is not true. Based on history, most cavalry regiments and squadron operations may, at some point, require close combat. When close combat is required, there will be no substitute for the combat power and protection provided by armored protected combat vehicles such as MBTs, the AGS, and other armored protected systems. It is probable that there will be periodic attempts to lighten the force. We must plan to do so by introducing new systems which are based on more efficient technologies. Lightening the force by reducing or eliminating armored combat vehicles would have the undesirable effects recently corrected.

Due to the expansion of battlespace, it is imperative that maneuver brigades be provided with cavalry scouts other than those organic to maneuver battalions for reconnaissance and screening as well as a myriad of other functions. How best to do this should be determined by the battle laboratory process as a top priority effort.

A significant future organizational goal must be cavalry scouts throughout the force mounted in a unique scout vehicle designed to emphasize stealth and facilitate reconnaissance and surveillance by both visual and electronic means. The danger which must be avoided is the thought that, since all cavalry scout platoons are equipped, mounted and trained in the same basic reconnaissance and security tasks, they can all do the same thing. That simply will not be true. It is not true now. Cavalry scout platoons, backed up by the combat power inherent in the cavalry unit structure they operate in, can participate in all reconnaissance, security operations, and other combat operations conducted by their parent unit in an economy-of-force role. But the cavalry scout platoons of a maneuver battalion or brigade operating basically on its own, without the supporting structure of a regimental or divisional cavalry squadron and troop, are somewhat limited. Without reinforcement, they will be suitable only for reconnaissance missions which do not require close combat to develop a situation, and to screen and to accomplish other scout functions which do not require close combat (such as liaison). The sooner all cavalry scouts can be provided a platform optimized for reconnaissance and surveillance, and the sooner the AGS is fielded for the 2d ACR and other light cavalry components of the reconnaissance and security structure, the greater the capability of the force as a whole.

Although, in the near term, cavalry scouts must continue to be able to operate from any platform, a vehicle specifically

designed for reconnaissance will enhance scout survivability and mission success of the parent unit. The HMMWV, although its mobility is reasonably good, does not provide the requisite degree of protection. The CFV provides an acceptable degree of armor protection but is not a suitable reconnaissance and surveillance platform, and does not permit the required degree of stealth. The TRADOC Unique Scout Vehicle Mission Needs Statement, recently validated by HQDA DCSOPS, reflects significant vehicle characteristics which may impact doctrine and organizational concepts, particularly when put in context with the horizontal integration effort. For example...

- Elevated multi-sensors suite to include thermal, acoustic, radar, and LADAR (laser radar) designed to interface with manned and unmanned ground and aerial sensor platforms.
- A jam-resistant, secure, difficult-to-intercept communications system with a range of at least 100 km.
- A unique vehicle design integrating low observable technologies to make the vehicle difficult to see, hear, or otherwise detect.
- A mobility differential provided by a swim capability without preparation, extended range, sustained cross-country capabilities, self-recovery, and high speed.
- An integrated defensive suite which will include warning receivers and automatic countermeasures.
- Advanced crew stations for a crew of three with provisions for a fourth scout.
- A self-defense weapons system capable of suppression and reconnaissance by fire.
- Modular design to permit the vehicle to be reconfigurable from approximately eight tons to 15 tons.
- Air transportable in C130, C141, C17, and CH47D, and capable of low velocity air drop.

The routine use of UAVs and all other available see-over-the-hill technologies will be an essential element of cavalry operations. Some of these technologies should be integrated into cavalry organizational structure to increase battlespace, operational tempo, and the ability to use standoff firepower. However, the cavalry scout will remain the essential element around which cavalry organizational design and doctrine must pivot.

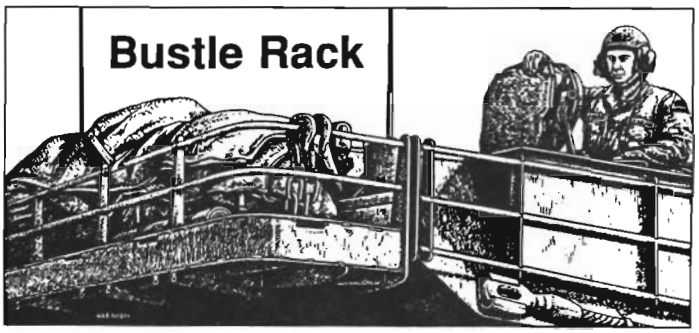
NLOS and LOSAT should be viewed as maturing systems for inclusion in the cavalry organizational structure. Both will extend close battlespace significantly by providing standoff firepower. The NLOS, in particular, is well suited to supplement and complement cavalry scout activities by providing very long range indirect standoff firepower. The LOSAT will supplement and complement armor support provided by MBTs or AGSs for cavalry scouts. The LOSAT will also provide an anvil around which a defense can be solidified by buying time with long range direct fire attrition. Cavalry units must strive to kill with standoff firepower whenever possible to protect their highly trained and skilled personnel whose value will increase significantly as battle experience is gained.

The cavalry scout is the heart and soul of reconnaissance and security activities essential to successful maneuver and combat operations. Thus, an enhancement of cavalry scout activities and the synchronization of those activities with corps, division, maneuver brigade/battalion activities will produce a force multiplier effect. The enabling technology to achieve this is the Hill effort linking IVIS, CVC2, POSNAV, and, eventually, IFF. The end result will be a force capability to fight much more efficiently and win, even when greatly outnumbered. We need to examine the payoffs of the unique cavalry scout reconnaissance platform in concert with the horizontal integration effort. Perhaps considerably more emphasis can be placed on the use of ambush tactics and the use of standoff firepower.

BOTTOM LINES: Reconnaissance and security doctrine is in good shape. All in all, doctrine for cavalry operations and employment of the cavalry scout is fine for the present and at least the near term. However, discussions with commanders in the field, analysis of National Training Center data, as well as insight gleaned during simulations-supported exercises all reflect that often scouts do not provide the necessary information. *The central problem we really need to focus on is how to improve the quality and timeliness of the reconnaissance information provided by cavalry scouts.* Reconnaissance is the common thread that permeates all cavalry and the preparation for and execution of all combat maneuver/operations. If we can improve the quality and timeliness of reconnaissance information, we will have significantly helped commanders and their staffs and enhanced force capabilities. Therefore, we must focus on how best to fix the problem. The immediate requirements are:

- Well trained scouts.
- Commanders better prepared to employ scouts during preparation for and conduct of battle.
- State-of-the-art information acquisition systems for our scouts.
- Bringing the horizontal integration effort to reality, to include state-of-the-art, reliable, rapid, secure communications for scouts.
- A scout vehicle designed to capitalize on stealth and to facilitate reconnaissance and extended surveillance of the battlespace.
- Integration and testing of emerging technology.
- Determinations of how new technology, when fielded, will impact on unit structure.

The Armor Center, as the Army proponent for mounted warfighting battlespace, must address the above in the battle laboratory process in accordance with the applicable precepts of the new FM 100-5. *"...Doctrine must be the engine that drives the exploitation of technology."* Only through the Battle Laboratory/Louisiana Maneuvers process can we ensure a timely, efficient, evolutionary, affordable preparation and the modernization required for 21st century war. The field, TRADOC, and the Armor Center must continue to work in concert to ensure the force is properly prepared through the Battle Laboratory/Louisiana Maneuver process. It is the best way to get the job done.



Tool Improvement Program Suggestions (TIPS)

TIPS is an Army tool suggestion program designed to allow users of Army tools to submit their ideas for improving tool efficiency directly to the program manager for consideration. The program manager logs the suggester's idea into the computer and tasks the Army subject matter experts (SME) for their technical evaluation and, based on their findings, approves or disapproves the idea. Input ideas are called initiatives. Suggesters may submit initiatives that recommend adding tools to a tool kit, modifying existing tools, fabricating new tools, or deleting tools from a tool kit. Suggesters are urged to contact the local U.S. Army Tank Automotive Command Logistics Assistance Representative (TACOM LAR) before submitting initiatives pertaining to wheeled and/or tracked vehicles. This is necessary to preclude duplicated suggestions and save time. The TACOM LAR has the latest maintenance and tool information available and is charged with the responsibility of problem resolution for these vehicle systems.

Soldier and civilian users of Army tools, interested in improving productivity and conserving resources, should call Tom Justus at DSN 345-2513 or CML 703-355-2513 or send a DATAFAX message to DSN 345-3252 or CML (703) 355-3252 for an information package and/or assistance prior to submitting initiatives.

Senior Officer Logistics Management Course (SOLMC)

The Senior Officer Logistics Management Course (SOLMC) is specifically designed as a precommand refresher course for commanders and their primary staffs at the battalion and brigade level in the logistics arena.

The course encompasses maintenance, supply, and transportation procedures, as well as hands-on application in maintenance, with vehicles, weapons, ammunition, medical equipment, communications, NBC equipment, and common soldier support equipment. SOLMC complements all Precommand Courses (PCC) by providing a detailed update on current logistics issues.

The course is designed for all Army leaders in all branches and is open to officers in the grade of major and above in the Active and Reserve Components, and to DOD civilians in the grade of GS11 and above.

The one-week course is conducted ten times each fiscal year at Fort Knox, Ky. Class quotas may be obtained through normal TRADOC channels. For more information contact CPT Lee or CPT Higdon, DSN 464-7133/3411 or CML (502) 624-7133/3411.

Course Schedule
SCH 171 CRS 8A-F23

FY94

94-05	13-18 Feb 94
94-06	20-25 Mar 94
94-07	17-22 Apr 94
94-08	15-20 May 94
94-09	19-24 Jun 94
94-10	24-29 Jul 94
94-11	21-26 Aug 94
94-12	18-23 Sep 94

FY95

95-01	16-21 Oct 94
95-02	13-18 Nov 94
95-03	4-9 Dec 94
95-04	8-13 Jan 95
95-05	12-17 Feb 95
95-06	19-24 Mar 95
95-07	16-21 Apr 95
95-08	14-19 May 95
95-09	18-23 Jun 95
95-10	16-21 Jul 95
95-11	20-25 Aug 95
95-12	17-22 Sep 95

BMOC Prepares Officers For Maintenance Positions

The Battalion Motor Officer Course (BMOC), at Ft. Knox, Ky., is designed to prepare company-grade officers and warrant officers, of all branches, and Allied officers to meet the challenges of today's Army maintenance program. The course is designed to prepare these officers for assignment to unit-level maintenance positions (battalion/squadron with emphasis on management and supervisory operations).

In addition to maintenance management skills, students get hands-on training with former motor sergeants as instructors.

The course (formerly JOMC) is now only four weeks long (shortened from six weeks), allowing more active duty officers to attend. This will also help the Reserve Component officers who must leave a full time job to attend.

Even with all the cutbacks and downsizing, the course continues to maintain a high level of quality instruction. BMOC includes instruction on Logistics Management, the Army Maintenance System, Supervising the Publication System, Unit Maintenance Operations, Operational Records and Dispatch, Maintenance Records, Repair Parts Supply System, Unit Level Logistics System, Material Conditional Status Report, Safety, Automotive Principles and Electric Troubleshooting, Environmentally Hazardous Materials, Preventive Maintenance Indicators, Supervising Vehicle Recovery, Supervising Troubleshooting, Direct Unit Maintenance Operation, and Supervising Scheduled Services.

If you are an officer who needs this training, or a commander who needs to train his maintenance officers, please call DSN 464-7756/8510 or Commercial (502) 624-7756/8510. The following is the FY94 Schedule.

CLASS	REPORT DATE	START DATE	END DATE
006	15 Feb 94	16 Feb 94	18 Mar 94
007	2 Mar 94	3 Mar 94	1 Apr 94
008	16 Mar 94	17 Mar 94	15 Apr 94
009	30 Mar 94	31 Mar 94	29 Apr 94
010	11 Apr 94	12 Apr 94	11 May 94
011	27 Apr 94	28 Apr 94	27 May 94
012	17 May 94	18 May 94	17 Jun 94
013	1 Jun 94	2 Jun 94	1 Jul 94
014	6 Jul 94	7 Jul 94	5 Aug 94
015	26 Jul 94	27 Jul 94	25 Aug 94
016	9 Aug 94	10 Aug 94	9 Sep 94

USMA Seeks YG1986-1990 Officers

The Department of Social Sciences at the United States Military Academy is looking for highly qualified company grade ROTC or OCS officers from Basic Year Group's 1986 to 1990 who are interested now or may have a future interest in civilian graduate study, followed by a teaching assignment at West Point. The Department of Social Sciences educates cadets in the academic disciplines of Political Science (American and International) and Economics. The Department's selection process is exceptionally competitive and requires officers to express their interest early — it is never too early to begin the application process. Under consideration now are the applications of officers who might be available to start graduate study in the summer of 1995 or later. Officers available in the 1995 group must complete their applications, including reported GRE or GMAT Scores, no later than 28 February 1994. Selection criteria include: branch qualification before beginning graduate school, demonstration of strong, long-term military potential; and, undergraduate or graduate records which indicate the ability to gain admission and successfully complete graduate study at a top American university. For more information please write: Department of Social Sciences; United States Military Academy; ATTN: CPT Dana Isaacoff; West Point, NY 10996.

BOOKS

Securing Europe by Richard H. Ullman, Princeton University Press, 183 pages. $21.95.

The window of my study looks out on a motor pool of about a hundred armored vehicles. These weapon systems, and thousands more like them across the continent, have been maintained at great expense by the American people to help ensure the security of Europe for over 40 years. The end of the Cold War has led to a dramatic decrease in the number of American forces in Europe, but has also loosened the chains which suspended history for half a century; the horrible ethnic violence in the former Yugoslavia threatens to spill over geographic boundaries and again involve the world's great powers in a war in Europe.

Scholarly attempts to come to terms with the implications of change in the global system, even as that change is taking place, are always brave and worthwhile endeavors. Richard Ullman's *Securing Europe* is particularly so. It went to press at what he describes as "a moment of maximum international political uncertainty" during the buildup to Operation DESERT STORM and the flowering of a new spirit of cooperation between the superpowers in the United Nations. The two years since then have occasioned great change in the international system, but Ullman's book is far from outdated; in fact, his discussions of the conflict between Armenians and Azerbaijanis and of the reduction of American forces in Europe could have appeared under the headlines in this morning's newspapers.

However, the real importance of *Securing Europe* arises from the perspective it gives on what was for so many years the central issue of international relations. Ullman argues that, though "the history of the modern state system has been intertwined with the history of war and peace in Europe... this is no longer the case. No longer is there a serious likelihood of war among Europe's major states." Because neither the former Soviet Union nor the new unified Germany now has anything to gain from territorial expansion, there is a negligible risk of a European conflict precipitating a Third World War.

This view is in direct conflict with the realist thesis, presented by University of Chicago political scientist John J. Mearsheimer in the August 1990 issue of the *Atlantic Monthly* under the provocative title, "Why We Will Soon Miss the Cold War." The crux of this argument is that bipolarity kept the lesser powers in order; the withdrawal of American and Soviet conventional and nuclear forces will clear the stage for the same sorts of "shifting alignments and complex maneuverings for power" that characterized European politics prior to the Cold War — and sowed the seeds of both World Wars.

Ullman believes that this structuralist viewpoint neglects many of the dramatic changes in international politics of the last 50 years. Marked improvements in communications technology and satellite surveillance equipment have reduced the ability of any nation to mount surprise military offensives; long years of consultation in forums, including the Western European Union and NATO, have increased both the ability and the desire of nations to solve problems diplomatically. Most important, however, is the fact that democracies do not attack democracies; Ullman argues that this is particularly true in Europe, where the people know the high costs of war from bitter experience and will not again allow governments to attempt unreasonable land grabs at the cost of their blood. The popular German demonstrations against ethnic violence, with their *leitmotif* of "Never Again," provide support for the contention that both Germany and Europe have changed. It is no longer necessary for extra-European powers to impose "peace through superior firepower" on the civilized, democratic states of Western Europe.

Ullman argues that maintaining the division of Europe into military blocs is not only unnecessary, but is also potentially harmful: "It perpetuates adversarial images and behavior, and it impedes the processes by which what was once a deeply divided contintent can be knit together to form a political whole." Instead, the end of the Cold War allows, and in fact demands, the creation of a European Security Organization (ESO), composed of the former members of both NATO and the Warsaw Treaty Organization, which would focus on European arms control, collective security, and confidence-building measures. NATO should explicitly concentrate on bringing its former adversaries into the fold and assisting them in the difficult transition to democratic free market states in order to create a "zone of peace" across all of Europe.

This new European Security Organization would, like its precursors, be dedicated only to preventing large-scale war involving the great powers in Europe. More limited conflicts, admittedly much more likely to flare up, but not threatening the vital interests of most members of the ESO, would be dealt with politically and economically:

> *If the antagonists were relatively weak and if their dispute appeared to endanger no one but themselves... for other states to risk the lives of their own citizens in attempting to impose a settlement would put too severe a strain on their own domestic politics.*

It is here that the passage of time since the publication of *Securing Europe* most gnaws at the reader. Given the brutal "ethnic cleansing" and rabid nationalism now at work in the former Yugoslavia, would Ullman continue to prescribe such a limited role for the European Security Organization — or for NATO?

The events of the past two years have strengthened Professor Ullman's central thesis: neither Germany nor Russia will "face any question for which the expansionist use of military power might seem the answer" in the foreseeable future. As a result, there is no longer a serious likelihood of war among Europe's major states, the threat which dominated America's national security policy for the past 40 years. It remains to be seen whether this peace in Europe will be divisible; that is, whether the major powers will be able to "wall off and quarantine" ethnic conflicts within European states without serious fears that the spark of violence there will touch off the powder keg of wider war.

Though we have come so far, we have yet so far to go. The tanks outside my window are still necessary; not to deter a Soviet invasion, but to build walls around bloody ethnic conflicts. Thus we measure progress in securing Europe.

JOHN A. NAGL
CPT, Armor
1-1 Cav, Germany

Achtung-Panzer: The Development of Armoured Forces, Their Tactics and Operational Potential by Major General Heinz Guderian. Translation by Christopher Duffy. Introduction and Notes by Paul Harris. Arms and Armour Press, London, 1992. 220 pages. $20.00.

Heinz Guderian was a product of the German General Staff, "the intellectual elite of the Army which formulated its doctrine and made its war plans." During the First World War, Guderian served as both a signals and staff officer. After the war, he was assigned to the new Motor Transport Troops and began to study the possibilities of employing motorized and, eventually, armored forces.

The German Army had gained little experience in mechanized warfare during World War I, but Guderian enthusiastically carried out his studies all the same. He studied numerous foreign sources, particularly the British and the French. It was on the basis of the Allies' experiences that Guderian began to formulate his own ideas about the use of armored forces. During the latter 1920s, Guderian wrote and taught extensively on the use of motorized troops and tanks, and was considered to be something of an expert on the subject.

Guderian eventually found himself assigned to the Inspectorate of Transport Troops, where, despite the prohibitions of the Treaty of Versailles, the German Army was developing its doctrine for the use of

At left, early models of the PzKpw III, one of the designs developed during the period of German rearmament in the 1930s.

armored forces. Shortly after Hitler's rise to power, Guderian would be assigned to command one of Germany's first three Panzer divisions. It was during this period that Guderian wrote *Achtung-Panzer!*, which was first published in 1937.

It was Guderian's belief that the tank was the modern weapon with the greatest offensive potential, or "striking power":

> *"It will be the main battle-winning weapon, wherever it is put into action, and the other weapons must accommodate themselves to its needs."*

This fact must be recognized, Guderian pointed out, if Germany was to ever have the means of achieving decisive victory on the battlefield.

Guderian developed his argument around an analysis of armored operations conducted during the previous war. The first half of his work describes the technological and operational developments taking place during that conflict and how they effected it. Guderian rightly argues that the weapons and technology available at the beginning of the war had made the defense the dominant form of warfare. Yet, the armies on the Western Front continued to impale themselves on increasingly deadly defensive works, with little noticeable effect.

However, Guderian notes that the victory lay "within the grasp of the technology of the time." It was in the use of new weapons, such as the plane and the tank, "used *en masse* and with the advantage of surprise that success was possible." It was the British who fielded the first operational armored force of the war and the Allies would continue to predominate in the use of armor throughout the war.

Yet the Allies armor capabilities did not guarantee their success. For instance, despite the brilliant planning and extensive preparations made for the armored assault on Cambrai in 1917, it was an overall failure. Despite initial surprise and success, the final objectives delineated in the plan were never reached. The traditional arms of service — the infantry, cavalry, and artillery — were far too slow to maintain the momentum necessary to exploit the initial success of the tank forces, and, as a consequence, final victory eluded the attacker. Guderian observed that the Cambrai recipe was repeated numerous times, with much the same effect, despite the best efforts of conscientious officers to overcome the difficulties involved.

Another problem was that the Allies often parceled out their tanks to infantry formations, defying the military principle of concentration. For a tank attack to be successful, it needed to be conducted *en masse,* in great depth, and with the element of surprise. Guderian reemphasizes this point throughout his work. The Germans, for their part, did little in the way of developing the weapons and tactics for their own defense against the Allies' armor threat. This near indifference, Guderian believed, was a major factor in Germany's eventual defeat.

As to why the Allies, with their preponderance of tanks, could not wring a decisive victory from their advantage in armor, Guderian noted that the technological developments of the First World War were but the beginning of a "revolution." New weapons, despite their increasing availability, were "underestimated at the time of the war, and by the Allies no less than the Germans. This misappreciation led in turn to the misuse of those weapons in the field."

The second half of *Achtung-Panzer!* deals with technological and doctrinal development of mechanized forces after the war and up to the period of the book's publication. During this period, Germany was restricted from owning armor by the Versailles Treaty. Therefore, the major developments in the field were primarily those of the former Allies, Britain and France. Guderian was far more favorable to the work of the British tank men, who emphasized total-force mechanization and all-arms cooperation, as opposed to the French, who put excessive reliance on cavalry-type reconnaissance formations and their predisposition to infantry supporting roles for tanks. But Guderian believed that both Britain and France were victims of their own experience and traditions.

In reference to the development of Germany's Panzer forces, Guderian distilled his views on the effective employment. Probably the two most important aspects of his ideas were: 1) the attacking of enemy forces in depth, and 2) the organization of a mechanized offensive force built around the potential of the tank.

Guderian believed that the two newest arms, the tank and the airplane, were key to attacking and destroying the enemy in depth. However, his insistence on the extensive use of these weapons did not deny the importance of other, traditional arms.

> *"Tanks were unable by themselves to meet all the combat tasks which come their way; the other arms will be needed as well, for example to deal with difficult terrain, artificial obstacles, or antitank weapons sited in "tank prohibited" ground. In this requirement, the tanks differ in no respect from the other arms, and inter-arm cooperation is therefore a matter of fundamental importance."*

Guderian suggested the mechanization of infantry, artillery, engineers, and support services, each with their own specialized transport. Such mechanization would allow the armored forces to exploit success on the battlefield and avoid the pitfalls experienced in the previous war. Guderian also addressed the use of radio as a means of command and control. As a former signals officer, Guderian thoroughly understood the potential of the wireless. As Paul Harris points out, the Panzers were better outfitted with radio equipment than their adversaries and were more effective as a result.

If there is a hidden agenda behind *Achtung-Panzer!,* it is that the German Army would be better served by the assigning of substantial resources to the Panzer forces. Germany was undergoing extensive rearmament program at the time of its writing, and Guderian and his companions were fighting for their fair share. It is interesting to note that despite their great successes early in the Second World War, the ratio of mechanized forces to the traditional arms remained quite low.

I highly recommend this book to anyone with a serious interest in the development of armored warfare. Guderian is insightful, and his writing is straight to the point, avoiding excessive jargon and the plethora of acronyms so common in much of today's military works. All this from a man who would himself become a successful leader of Panzer forces in numerous theaters. I believe *Achtung-Panzer!* should be required reading for all combined-arms officers.

STEPHEN M. MOORE
1LT, Infantry
Fairbanks, Alaska

Converting a CONEX Container Into a Bn/TF Command Post

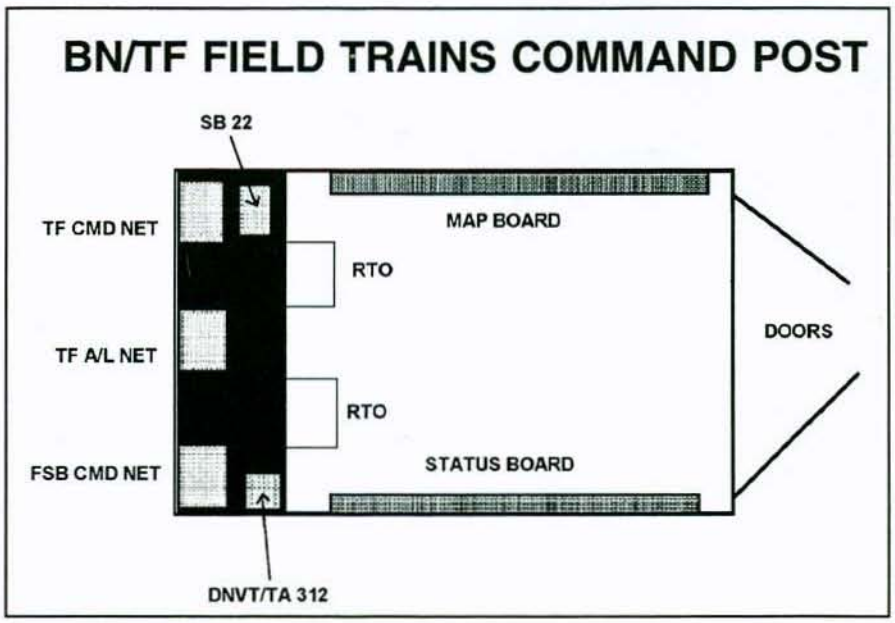
by Captain Christopher Mitchell

Establishing a field trains command post is a dilemma faced by the new battalion/task force headquarters company commander. Since our tables of organization and equipment are getting smaller and smaller every day, and the odds of procuring a new piece of equipment for the HHC commander are slim to none, the solution is to build it yourself.

Doctrinally the field trains command post consists of two radios, a SB 22 switchboard, and a map, all organized in a tent. This configuration works in some situations, but since the HHC commander is one of the key players in the logistics of a BN/TF, he needs a command post that requires little maintenance and setup time, offers adequate communications, the ability to track operations, and is highly mobile. Various methods of building CPs work; what is used depends on what's available. Trailers are easiest to convert, and are usually more readily available. Building a CP out of plywood is another technique, but one which loses flexibility by committing a prime mover to continuously haul the CP. The power supply for the radios is the greatest obstacle to overcome. Ideally, using a generator is the best alternative. Another source of power is the prime mover itself. If no other source is available, an alternative is speakers and hand mikes with extended cables remoted from the company commander's HUMMER.

A technique that has worked well is to use a shipping CONEX (See sketch). A CONEX converted to a self-contained command post can be accomplished with organic equipment and material in the battalion motorpool. Installation of a platform or table to mount the radio installation kits is the most time-consuming aspect of the conversion. Once converted, the S1 2½-ton truck can carry a CONEX configured in this way (Cargo straps and chains hold it in place) and when the truck has to be used for other missions, the CONEX can be removed by a HEMTT crane, and dug in. When dug in, the CONEX makes an excellent foundation for a command bunker complex. The prime mover for this CONEX does not have to be the S1 truck; it can be any truck within the company.

The greatest advantage of the CONEX command post is its mobility. Moving the CP by short halts, the HHC commander can now monitor combat status reports, anticipate with the S4 the battalion's ammunition needs, prepare for LOGPACs, reconfigure loads, or dispatch trucks for EPW collection, while moving the field trains. A quick call from the HHC commander to the FSB commander, warning of potential supply needs, can mean the difference between success or failure. A self-contained CP reduces setup time and allows for a quick establishment of a key command and control asset for the LOG players in the battalion and the battalion commander. The addition of another net facilitates C^2 for the HHC commander. The third net can be set on the battalion/TF command net. Because our doctrine requires the logistical players to anticipate needs, the addition of another net allows the commander to monitor battalion operations, which is critical to this function. In some cases, the field trains can now assist in taking reports while the Combat Trains Command Post is moving, or for some reason can't be reached. In other words, the field trains CP can form a similar relationship with the combat trains CP as that of the TOC and TAC. The addition of another FM net changes the headquarters company commander from a reactor to an actor. Additions to the CP are only limited by the imagination, and mission needs. For example: externally mounted reels of telephone wire with labeled lines designated for each tenant of the field trains will reduce the time it takes to establish internal communications. Additionally, when deploying, the CONEX can also serve as an arms room and be used to store all the other orderly room and S1 shop equipment that must deploy. What actually goes in the CONEX is obviously up to the commander. The CONEX offers more mobility and flexibility for the battalion/task force logistical command and control. The type of CP you build obviously depends on the time and equipment available, and the specific needs of your organization.



Captain Christopher Mitchell is a graduate of the Airborne and Ranger courses, AOB, IOAC, and CAS³. He served in the FRG as a tank platoon leader, company XO, and BMO in 2/68 Armor, 8th ID. He also served as the adjutant, Bravo Company commander, and HHC commander in 3/67 Armor, 1st "Tiger" Bde, 2AD. He was recently assigned to the Command and Staff Department, USAARMS, as the author of FM 90-3, Desert Operations, and is currently an AOAC small group instructor.

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