ARMOR

The Magazine of Mobile Warfare

March-April 1985

United States Army Armor School

"To disseminate knowledge of the military arts and sciences, with special attention to mobility in ground warfare, to promote professional improvement of the Armor Community, and to preserve and foster the spirit, the traditions, and the solidarity of Armor in the Army of the United States."

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ARMOR The Magazine of Mobile Warfare

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FEATURES

DEPARTMENTS

COVER

The development of ultralight combat vehicles, including several for U.S. forces, grows out of a need for greater strategic mobility. But ultralights aren't an easy answer in themselves, warns former CIA analyst Edwin W. Besch in an article that begins on page 24.

LETTERS

The Sergeant Has It Right

Dear Sir,

I was pleased to see the article, "A Gunner's Thoughts on the Tank Tables," in the November-December 1984 issue of *ARMOR* Magazine.

The entire text brought back memories of the range and ammunition allocation problems that I experienced during my active duty days, from tank platoon leader to division commander. It seems that when we had the ranges we were short of ammunition, and *vice versa*.

As Sergeant Gray points out, there are many variables to tank gunnery training and qualification courses. Personally, although I feel we came close, we never licked them and I have serious doubts that they will ever be wholly conquered.

Be that as it may, the article depicts the concerns of a tank commander or gunner who must undergo this training as a professional. It is *he* who has to do it on a daily basis and *he* should be listened to by all concerned.

Congratulations to you, Sergeant Gray. You are on the right track.

GEORGE S. PATTON
Major General, USA (Ret)

Colonel Icks Remembered

Dear Sir,

On 19 February 1985, the world lost one of the great research pioneers and authors on armored fighting vehicles and armored warfare with the death of Colonel Robert J. Icks, AUS Retired.

Colonel Icks was the author or co-author of seven books and many articles published here and in Europe and the "Encyclopedia Britannica" between 1929 and 1976, including the first book on armored warfare published in the U.S. He was a member of the Ordnance-Industry Tank Committee from 1950 to 1959. His library of thousands of books, research papers and photographs has been received by the Patton Museum at Fort Knox, Ky. where it will be available to armor researchers.

Colonel Icks served in the Merchant Marine and as an Army enlisted man in WW I. He graduated from Ripon college in 1922 and became a Reserve officer in 1927. During WW II he was in charge of automotive testing at Aberdeen Proving Ground, where he designed the Munson and Churchville test courses. Later, at the Office of Chief of Ordnance-Detroit, he set up vehicle manufacturing inspection standards and then became deputy chief of the Engineering-Manufacturing Division. He directed the development of vehicle waterproofing devices used in the 1942 North African and, later, worldwide amphibious assault landings. He was awarded the Legion of Merit for his work in this area.

He retired from his position as an insurance executive in 1968. A native of Green Bay, Wisc., he was one of the original founders of the Green Bay Packers.

His first book on armor, co-authored with Major Ralph Jones and Captain George Rarey, was "The Fighting Tanks, Since 1916," was published in 1933.

He was a regular contributor to the future of armor, the Army and the Patton Museum for over half a century. He will never be forgotten.

JOHN A. CAMPBELL
Lieutenant Colonel (Ret.)
Patton Museum Volunteer

Little Big Horn Group

Dear Sir,

Cavalrymen who are interested in the study of the Battle of the Little Big Horn (Custer's Last Stand), Custer and his times, and the old horse cavalry of that day should contact the Little Big Horn Association and become acquainted with others who hold the same interests.

You may write to the Little Big Horn Association, P.O. Box 633, Boaz, Alabama, 35957 for more information on this interesting and historical battle and period.

JOHN M. CARROLL
Bryan, Texas

Some St. Vith Thoughts

Dear Sir,

The article on the battle of St. Vith ("Armor's Stand At St. Vith," November-December 1984 *ARMOR)* raised several good questions, but left some important ones out. A basic question in studying military history must be answered before analyzing any battle. That question is: Is a battle won by what one side did right, or by the side that did the least number of things wrong? From my reading, the latter seems to be true. Each side must be looked at to determine their objectives and their mistakes if the lesson is to be learned.

What happened at St. Vith is easier to understand if you look at the actual fighting strength on each side. Naming the units does not accurately reflect the combat power in the line. Using the authorized TO&E strengths and, where known, the actual strengths, I assembled the following tables. The infantry column lists only the number of troops in line infantry squads and not support troops, although many of these were used as infantry. The German infantry figures are probably high. Accurate figures just do not exist. Armored fighting vehicles are easier to count and include tanks, tank destroyers and shell-firing armored cars.

	Inf	AFV
17 December		
German	1,520	24
US	4,410	442
18 December		
German	8,900	92
US	4,410	442
19 December		
German	5,518	64
US	4,410	442
20 December		
German	12,029	134
US	4,410	442
21-23 December		
German	17,673	220
US	4,410	442

Because of lack of accurate figures, I did not count artillery, but U.S. troops had almost unlimited support while the Germans had only light support until after 21 December. I do not know if any counter-battery fires were used by either side.

Generally, the opposing armor was equal, for almost no *Panther* tanks were present, the majority of German armor being the *Panzer IV* and the *Sturmgeschutze*. The few *King Tigers* (no *Tiger Is* were used) belonged to the 501st SS *Panzer Abteilung* (section) assigned to the 1st SS *Panzer* Division and were only in the area on 18 December.

The famous story of the *Tiger* tank killed by an *M8* armored car deserves looking into. It is an unlikely event because the 37-mm gun on the *M8* would have to have had penetrated an inch or more of armor than it was capable of doing. If a picture of this supposed incident exists it probably shows a *Panzer IV* rather than a *Tiger*. The *Ferdinand* that is claimed to have been encountered in the Bulge could well have been a *Jadgpanzer* as no *Ferdinands* served on the Western Front. Vehicle ID was not one of our strong points at St. Vith. (Some things never change).

The troops assigned to the 7th Armored Division fought well, but mistakes were made that cost heavily. The worst losses occured during the withdrawals. What the U.S. operations at St. Vith *did* display was the ignored side of inititative (See Gaining and Exploiting The Initiative," July-August 1984 *ARMOR*). If you can make the enemy react to your moves and you can choose the time, place and conditions of an engagement then you have the initiative. Offensive action is simply an extreme example of this.

The efforts of U.S. troops at St. Vith would have been in vain if not for the following facts:

1. The tremendous traffic jams behind the German lines that held up some units for 2-3 weeks before they could get to battle.

2. The very best German units available to capture St. Vith (the 1st & 2d *Panzer* Divisions) were advancing west. Only the 18th *Volksgrenadier* Division (VGD) was assigned to capture this critical road junction.

3. The German infantry lacked radios. They were authorized radios down to platoon level, but most units had them only to company level. U.S. forces had radios down to squad level.

4. Losses in Normandy and the retreat through France had cost the Germans heavily in commanders at the small unit level. U.S. forces did not suffer comparable losses.

What would have happened if...

1. *Kampfgruppen Sandig* and *Hansen* (2 SS *panzer* regiments with 24 assault guns and 50 tanks) had pushed on to Vielsalm from Poteau instead of turning north at midday on 18 December?

2. The 2d *Panzer* Division had exploited the success of the 293d Regiment of the 18th *VGD* on the morning of 17 December?

3. The *Fuhrer Beliet* Brigade had exploited the success of the 294th and 295th regiments of the 18th *VGD* on the morning of 18 December?

4. St. Vith had been assigned to the 6th *Panzer* Army and 1st SS *Panzer* Division was to have captured it?

Any one of these would have changed the course of the Battle of the Bulge. The St. Vith battle progressed the way it did mainly because of what the Germans *did not do* rather that what the 7th Armored Divison *did do.*

I am not trying to take anything away from what our GIs did. It was because of them that St. Vith was held as long as it was. U.S. soldiers have always been our strong point, but how and what they were trained for, and our equipment, have never been up to their levels.

One last item. For the reconnaissance purist, I suggest reading very carefully how cavalry units were used during the Bulge. The cavalry was used just like infantry and armor. Their light vehicles and weapons only resulted in needless losses when faced with superior enemy armor. Look at how many scout jeeps had armor put on them in an effort to save the crews.

CHRISTOPHER F. SCHNEIDER
Staff Sergeant, Armor
Cicero, IN

Camouflage: State of Mind?

Dear Sir,

As a relative old timer, I would like to throw in my two cents on the question of camouflage. In particular, I would like to comment on Sgt. Smith's letter in the November-December issue.

When I first went to Vietnam, we were still wearing white name tapes, yellow rank insignia, and full color unit patches. We have never gone back to this and continued from the basic green fatigues to camouflaged BDUs.

I do not think that camouflage is a "defensive" item, nor do I think that the only reason for using it is lack of air superiority.

Camouflage is both cheap insurance and a force multiplier. Offensive or defensive, air superiority or not, any time that we can deceive the enemy as to our strength, position, or intentions, we have gained a tactical — if not strategic — advantage.

I believe that there is another reason for emphasis on camouflage, one that is equally important. Camouflage is a state of mind. Camouflage is needed because people are going to be out there doing their utmost to kill you. The use of camouflage in non-tactical and training situations can help bring that awareness home; therefore it can prepare people for the realities of the combat environment. Camouflage is a personal protection device, a kind of a cross between a flak jacket and a foxhole. And, just as the Army doesn't issue foxholes on the individual level, we will not be issued tactical camouflage. What is issued is the knowledge of how to dig a foxhole and how to employ camouflage.

MICHAEL M. SMITH
Captain, CE
Laurel, FL.

Combined Arms; An Author's Reply

Dear Sir,

I was very pleased to see Captain Peter Henry's reply to my article, "A New Concept For Combined Arms," that appeared in the January-February 1984 issue of *ARMOR* Magazine. The stirring up of professional thought is, after all, the whole purpose behind the magazine. However, I wish to clarify and restate my views on certain of the points brought up by Captain Henry.

I do not advocate the *de facto* abandonment of the combined arms concept at battalion level and below. What I do advocate is the meshing of our systems of maneuver to more closely match their capabilities and limitations with what history has shown us works best. The only abandonment I have advocated is the blatant penny-packing of our limited tank assets in the role of direct support of infantry. While it might be nice to have tanks in every mechanized company or battalion, history has shown us that tanks work better when massed, and when allowed to maneuver.

It's a tradeoff, of course, but the arrival of the IFV makes the tradeoff more acceptable. I imagine that even Captain Henry wouldn't mind having a fresh armor reserve poised to counterattack when the Russians finally do break through, as their doctrine says they will stop at nothing to achieve a breakthrough.

Captain Henry misses the point of utilizing IFV-equipped infantry without direct tank support. The argument is not over whether a *TOW* missile is better to have on the ground than a tank gun. The entire IFV package gives properly deployed mechanized infantry more independent staying power. Dug-in infantry supported by the heavier weapons of the IFV, will make it harder for the enemy to achieve a breakthrough.

While in the short run the defense may be stronger if tanks are also up in the frontline, once the penetration is made, the defense will be much weaker for lack of that fresh battlefield reserve.

After all, what is the difference between a 40-1 breakthrough or a 20-1 breakthrough? In both cases, the enemy will breakthrough. Sure, at 20-1 he will suffer more losses, but so will the defender, who has put in more troops to be chewed up. And the end result is the same: the bad guys have broken through and are driving for the Channel. But in the 40-1 situation, the defense probably won't collapse as readily as in the 20-1 because more forces have been preserved, not wasted in attempting to stop an enemy who is going to break through anyway.

Even Captain Henry probably sees the military wisdom in keeping a reserve. But he probably sees the holding back of the bulk of the tank forces as too radical. After all, he cites the traditional dominance of the main battle tank to be "largely as a result of its much greater volume of fire." But that's not true. The tank can dominate not because of its firepower, but because of the coupling of that firepower with maneuver/offensive action.

The tank, no matter how we look at it, is basically an offensive weapons system. To use it in any other way is to waste that maneuver which has allowed it to dominate.

Why have our tanks dig in with the infantry and attrite the enemy, then get pinned down and be picked off themselves? Wouldn't it be much better to have them cooling their heels to the rear, poised to come at the flank of the Soviet main thrust in a counterattack? A defensive battle could easily be transformed into a meeting engagement. Who do you think would have the advantage in a meeting engagement, the set-piece Russians, or the flexible, spunky Americans?

Captain Henry cites me for "retaining a trace of combined arms capability" by suggesting a mechanized infantry company be assigned to each tank battalion. This is not just to humor him. While IFV infantry may be able to function on the battlefield without *direct* tank support as long as there is *indirect* tank support in the form of an armored reserve, tanks cannot survive without close-in infantry support. This type of infantry has the job of maintaining the forward momentum of the tanks by providing a 360-degree observation, suppression of enemy AT fires, and, yes, the clearance of terrain less suitable for tanks.

Captain Henry thinks I am robbing our field commanders of the flexibility to determine their own tank:infantry ratio and making it harder to organize for rare situations (such as the employment of a tank-pure battalion).

Nothing can be further from the truth. Our field forces should be organized for the norm. This will give our commanders much more flexibility in not having to continually reorganize into the norm. They will have more time to worry about the task at hand and nothing is stopping a commander from adjusting his forces to the situation. Additionally, if our forces are organized as they will fight, stronger, more cohesive units will result.

Finally, Captain Henry sums up his discussion with the statement that "maneuver units employed in essentially static roles, particularly those astride obviously dominant terrain, will be located. . . and either tamed or rendered combat ineffective. . ." Because of this, he sees IFV infantry becoming solely a maneuver element alongside tanks, as "the absolute difference between attack and defend has lost much of its significance, at least at the lower echelons." But the potential enemy has much more on the ground than we do, and that we definitely do need the advantages of the defender in such a case is lost on him.

What infantry does best is hold ground and defend. The argument that it will become combat inefficient through indirect actions by the enemy is as old as WW I, where many lives were lost to prove it wrong. Infantry, properly deployed in depth, dug in and reinforced with obstacles, then smartly used once the battle is joined, is the fulcrum of the battlefield. It is around this fulcrum that our armor should be employed to take the wind out of the enemy's sails. We do not want to commit our forces to maneuvering anywhere and everywhere against a numerically superior foe, as Captain Henry seems to suggest. We want to save our punch for when and where the enemy shows his hand and then make our blow decisive.

JOHN J. McGRATH
1st Lieutenant, (P) Inf.

Dislikes New Pistol

Dear Sir,

To an informed student of the pistol, the Army's decision to replace our current service pistol with a 9-millimeter auto pistol is both disgusting and confusing.

The minimum standard set forth in the 1906 U.S. military trials in search of a new service weapon was: .45 caliber, 200 grain bullet, at about 900 feet per second muzzle velocity. These standards were set after the *most* extensive testing and consideration of all available pistol rounds. The Thompson-LaGarde report on this matter was the most definitive work ever done and remains so today.

The 9-millimeter did not meet those standards then and it does not today.

Perhaps those in charge of such matters believe that the opposition is not as tough now as in 1906 or 1911. I do not subscribe to that theory.

Those of us who may someday be called upon to do battlefield work have been let down. I am a serious student of the pistol and I do not take the matter lightly.

FRANK D. RANDALL
SSG, 1-108 Armor
GA ARNG

"Only the Rocks Live Forever"

This is a personal perspective on ideals for the professional military leader of the armed forces in terms of values and attitudes. My hope is that these thoughts will be remembered and will be of some future use to leaders as a simple guide and framework in service of our country.

There was an old Georgia Creek Indian saying that only the rocks live forever. Clausewitz stated that the commander must stand like a rock on which the waves break in vain. George Patton said that a military officer or non-commissioned officer must be a rock to withstand the storms and tests of time.

I have selected three rocks to serve as a beacon for the leader, rocks to provide strength and be a bulwark against the temptations and ordeals of life.

The first rock comes from the study of military history. Most historians differ on the great leaders of the past. My selections, on the basis of leadership, are: Hannibal of Carthage, George Washington, Napoleon Bonaparte, Robert E. Lee, and George Patton. In attempting to find a common thread from comprehensive study of these five, I have selected an excerpt from Freeman's last volume on Lee:

"And if one, only one, of the myriad incidents of his stirring life had to be selected to typify his message, as a man, to the young Americans who stood in hushed awe that rainy October morning as their parents wept at the passing of the Southern Arthur, who would hesitate in selecting that incident? It occurred in Northern Virginia on his last visit there. A young mother brought her baby to him to be blessed. He took the infant in his arms and looked long at it and then at her and slowly said: 'Teach him he must deny himself!' That is all. There is no mystery in the coffin at Lexington there in front of the windows that look to the sunrise."

The second rock is, "Be a Sam Damon." Of course, many have never read "Once an Eagle", by Anton Myrer. The book is a historical novel about two professional soldiers, Courtney Massengale and Sam Damon. The former is a careerist, ticket-puncher, self-seeker, and a political officer. The latter is a real soldier of great integrity, loyalty, courage, dedication, knowlege, and selflessness. It is a simple comparison of extremes. Sam Damon is the ideal. Among his traits, selflessness is key and foremost. Emulate his qualities and true patriotism.

Football and coaching is the source of the third rock. It comes from the late, great Paul "Bear" Bryant and his guiding principle for his players on the field and in life. Ask any former Alabama, Texas A&M, Kentucky, or Maryland athlete who played under the magnificent leader from Moro Bottom, Arkansas, and they all relate the same message: "Always show your class". There is also no secret under the hickory tree in Birmingham.

There they are. Deny yourself. Be a Sam Damon. Always show your class.

These three rocks have a great utility and value to our country far beyond my humble ability to relate them. I hope that they will serve you forever.

ROBERT LEE POWELL
Lieutenant Colonel, Infantry
HQ, FORSCOM

Steel Production and Ammo

Dear Sir,

I would like to comment on the letter from Gordon J. Douglas in the November-December 1984 issue of *ARMOR* Magazine.

Harry C. Thompson, author of "The Technical Services: The Ordnance Department: Procurement and Supply, 1960," in a table on page 152, shows that the Army procured from July 1940 to August 1945 more than 93,000,000 rounds of 105-mm howitzer ammunition. Mr. Douglas' guess is short by 50 percent concerning the number of rounds produced in WW II.

Second, on page 113 of the same book, we see that the ordnance program consumed 4,000,000 tons of steel in 1943 and the tank-automotive program used 7,000,000 tons. I would like to say that most procurement programs peaked in 1943 and the steel shortage was easing by this time.

Assuming that each steel 'can' weighs 10 pounds, 465,000 tons of steel would have been used to can all the 105-mm howitzer ammunition used in WW II.

Once again my calculations are different from Mr. Douglas' because I assume that no steel is returned for recycling. Even assuming this, the amount of steel that would have been consumed is small in comparison to the total amount of steel used in WW II.

The Reader's Digest Almanac 1984 states that U.S. steel production in 1983 was more than 100,000,000 tons, which indicates that (105-mm howitzer ammunition packaging) whould have amounted to 0.0465 percent of the 1983 production.

Packaging of ammunition is a very important function of its production. If a round does not function due to environmental or shipping damage, it is nothing more than an expensive piece of junk.

MARK SCHWALENBERG
Brookfield, WI

Red Tanks at Tatsinskaya

Dear Sir,

In his article, "Tatsinskaya and Soviet OMG Doctrine," Captain (P) Harold W. Coyle, in the January-February ARMOR Magazine, incorrectly described the composition of a Soviet tank corps in 1942.

While true that a tank corps then fielded three tank brigades, the two tank battalions of each brigade consisted of 21 and 31 tanks respectively, and not 23 tanks as stated. The first battalion of each of the two tank brigades was of homogenous composition and consisted of 21 *T-34* medium tanks. The second battalion was a light tank unit and consisted of a medium tank company (10 *T-34*s) and two light tank companies (10 *T-60*s or *T-70*s). When the battalion commander's light tank is added, this battalion fielded 31 tanks. Each tank brigade fielded 53 tanks, including the brigade commander's tank.

The article also stated that each tank corps fielded a motorized infantry battalion. This is incorrect. In addition to an infantry battalion in each tank brigade, the corps also had an infantry brigade organic, thus totaling 6 infantry battalions.

Captain Coyle is also in error when he stated that each tank corps had two self-propelled (SP) artillery regiments as part of its organization. According to Soviet military sources, SP artillery regiments were not part of a tank corps until 1943. While there is a possibility that two such regiments were added to Major General Badanov's 24th Tank Corps for the Tatsinskaya operation, Soviet military literature does not mention this (see A. I. Radzievskiy's *Tankovyy Udar* (Tank Strike), Marshal of Soviet Tank Forces Losik's *Stroitel'stvoi i Boevoe Primemenie Sovetskikh Tankovykh Voisk v Gody Velikoi Otechestvennoi Voiny* (The Building and Use of Soviet Tank Forces During the Great Patriotic War), and Krupchenko's *Sovetskie Tankovye Voiska 1941-1945* (Soviet Tank Forces 1941-1945).

For fire support, the tank corps relied on 32 45-mm and 76-mm artillery pieces as well as 8 *BM-8* or *BM-13* multiple rocket launchers and 44 82-mm and 120-mm mortars. Each tank corps also had an independent motorcycle battalion or an armored car battalion organic to it.

In all, a Soviet tank corps of 1942 fielded 7,800 personnel, 168 tanks (98 medium, 70 light), and 84 mortars, artillery pieces and rocket launchers. The first such formations were formed in April and May 1942 with 11 created in support of the various fronts and 14 in the *STAVKA* reserve.

Captain Coyle's statement that the OMG is not a new phenomenon, but rather the revamping of proven tactics to which modern weapons have been added, is a key point often overlooked by Western analysts. It should be noted that while in a conventional war, they will pose a grave threat to NATO forces, when used in conjunction with nuclear strikes their speed and lethality will be even greater.

At a time when many Western experts are arguing that the *creation* of OMGs is proof of the shift in Soviet military doctrine from a nuclear to a conventional emphasis, Soviet military literature continues to stress the importance of nuclear strikes, in conjunction with conventional forces, to inflict a decisive defeat on an opponent in the shortest possible time.

Soviet literature such as Sverdlov's *Takticheskiy Manevr* (Tactical Maneuver), or the 1984 edition of *Istoriya Voennogo Iskusstva* (History of the Military Art) — to name but two — leave little doubt as to Soviet intentions with regard to the use of nuclear weapons. These works recognize the unique place such weapons continue to hold in Soviet military doctrine.

This can be partly attributed to the significant advances the West has made in weapons technology, especially in the field of helicopters, ATGMs and FASCAM (family of scatterable mines) which some Soviet military writers feel have altered the correlation of forces enough to deny the Soviets the ratios necessary to ensure victory in a conventional conflict in Europe. Additionally, because of their destructive capability and their high accuracy, the Soviets classify these new weapons as *weapons of mass destruction* comparable to nuclear weapons in their effectiveness. This is one reason the Soviets have turned once again to mobile formations, in conjunction with nuclear strikes, to ensure victory in a European war.

What many Western analysts fail to recognize when examining the renewed emphasis the Soviets have given to mod rnizing their ground forces is their indispensability — according to the Soviets — in ensuring their success in a nuclear war.

The OMG is thus only a part of the Soviet formula for success in a European war. It should be examined in this context rather than independently.

GILBERTO VILLAHERMOSA
Captain, Armor
HQ, XVIII Airborne Corps

MG Frederic J. Brown
Commanding General
U.S. Army Armor Center

Manning Issues Revisited

To meet the challenges of the Army of Excellence, which requires fully trained soldiers and thoroughly professional leaders, the Armor Center is changing the program of instruction (POI) of both officer and NCO courses, developing leader certification to ensure excellence, and moving forward with the Excellence in Armor program (EIA) — formerly "Fast Track" — to get outstanding soldiers into the tank commander's station earlier in their careers.

We are also working to resolve current concerns, such as CMF 19 restructure, turnaround time, and OPMS/EPMS issues.

Leadership to Win

We've restructured leadership courses to develop leaders accustomed to assuming the initiative knowing the intent of the commander, one who is mentally agile, able to make decisions, and able to take decisive action in the absence of command communications. Our leaders, first and foremost, must be technically and tactically competent. To meet these demands, the Armor Center has made changes in some of the leader courses:

- Although the Armor Officer Advanced Course (AOAC) has been shortened to 20 weeks, the intensity of hands-on technical and tactical training has been greatly increased with the inclusion of five weeks in the field. The first 14 weeks now stress the skills necessary to function as a company/troop commander, while the remaining time is devoted to training in how to fight at the battalion/squadron and brigade/regimental levels. Course content is being updated to accommodate new weapons systems, devices, and doctrine.
- To help Reserve component company commanders keep pace with their active duty counterparts, the Armor Commander's Course has been scheduled to begin this summer at Gowan Field, Idaho. The 118-hour course is divided into two parts. The first week is devoted to staff planning, operations and intelligence estimates, offense, defense, the Threat, and combat service support (CSS). In the second week, the MILES system will be used for intensive field training in proven structured training exercises.
- The Advanced Noncommissioned Officer Course (ANCOC) is being improved to help develop solid platoon sergeants who are also capable of battlefield command of companies and troops if needed. The course has also been changed to align CMF 19 with Division 86 doctrine and to include CSS training.
- The Tank Commander's Course and the Scout Commander's Course are now being taught at Fort Knox. They are designed to train vehicle commanders on a specific vehicle. These courses will also be used to refresh the training of soldiers of all grades who have been away from a vehicle for two years or more.
- The Basic Noncommissioned Officer Course (BNCOC) has been lengthened to six weeks and now requires an NCO to pass the Tank Commander's Certification Test I (TCCT-I), our TCGST, prior to graduation.

This test requires demonstrated competence in the individual technical skills a leader requires. TCCT-I is intended to be an annual test for all tank commanders or prospective tank commanders and can serve as the basis for the commander's evaluation of the Skill Qualification Test (SQT).

The TCCT is designed to be administered by the unit master gunner as a hands-on, vehicle-specific test. The standards will be published so there will be no surprises. TCCT-I will also be integrated into the graduation requirements of the AOB and will be a prerequisite for entry to both the AOAC and the ANCOC. The TCCT is the Tank Crewman Gunnery Skills Test (TCGST) from the *new* FM 17-12 series. It is proven, it is current, and it formalizes an ongoing event. It does not add a new test for the force — it ensures that an existing test is given proper visibility and importance.

A second-level test, TCCT-II, is also being developed to be administered to top students in the Excellence in Armor program after their completion of BNCOC. The individual who passes this tough test will then be qualified for a range of positive personnel actions which we at Knox are working out with field commanders and the Deputy Chief of Staff for Personnel (DCSPER).

The Armor Center does not dictate who will get into the Excellence in Armor program; this is and must remain a chain-of-command call. For new entry soldiers considered as potential Excellence in Armor candidates, the 1st Armor Training Brigade provides the soldier with extra training and promotion to PFC. Once a soldier arrives at the unit, his unit chain of command decides whether he remians in the program. An outstanding soldier who is already in a unit can be placed in the program by his unit chain of command at any time. Candidates have been graduating from the Excellence in Armor program since last July.

We propose that if a soldier fails the TCCT-II, he will be dropped from the program.

We see the TCCT-II as an 8-hour comprehensive written and hands-on test of the skills and concepts a tank commander will need to fight his vehicle and survive. A test leading to implementation is planned for this coming fall. We at Knox want to ensure that this and the other programs we are developing to enhance tanker/cavalrymen excellence are right.

The Armor Center is also developing TCCT-III, a test to reconfirm a master gunner's knowledge of tank combat training. Division master gunners will be certified at Fort Knox annually, and they in turn will certify the other master gunners in their divisions. The test will be validated, beginning in April, with implementation possible as early as this fall — for division master gunners — and early next year for unit master gunners.

Force Structure

Last year, the Armor Center tackled the mission of restructuring CMF 19. We have completed the task and have documented the required changes. The purpose of the changes is to provide more experienced leaders in critical tank commander positions in armor and cavalry units and to enhance the promotion system to create a reasonable promotion opportunity from SSG to SFC and from MSG to SGM. We needed this change: in the past, a 19Z has had a 1-in-14 chance of making SGM, while in other branches, the chances were as high as 1-in-4. Under the revised system, the chances for an armor master sergeant will be about 1-in-5.

The restructure also upgrades battalion master gunners to MSG rank and battalion/squadron operations sergeants to SGM. The tank commander of one of the headquarters tanks in tank companies and cavalry troops is to be upgraded to SFC, and this slot will be filled by the unit master gunner.

The restructure will be effective when a unit transitions to the J-series TOE or when the next version of the MTOE is published.

The current Standard Grade Authorizations (SGA) for tank crews are also to be changed, with the senior tank crewman, now a SP5, becoming a SGT. This brings the slot more into line with other CMFs and offers a needed training plateau to prepare junior NCOs for the responsibilities of leaders and tank commanders. The recoding of the SP5 position to SGT should be finished in October 1985.

As for turn around time, we are working hard to increase it to 36 months. Results of recent briefings to the DCSPER and the Vice Chief of Staff of the Army are most encouraging.

Career Management

The OPMS study recently released concludes that many officer positions are not properly coded, making it difficult to select the best qualified for a specific position. Another major point of the study is that more combat arms officers are needed at the lieutenant level and more captains in combat support and combat service support. The chief of staff has approved these findings and has directed early implementation.

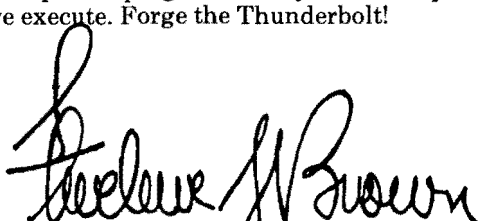
The strategy for doing this will start with a revision of AR 611-101 and DA Pamphlet 600-3, followed by a TOE and TDA "scrub" to code the positions accordingly. Captains and lieutenants will be polled in July, informally, to determine the willingness of the officer to rebranch voluntarily. If too few agree to rebranch, then the needs of the service will be met by involuntary rebranching. The Armor Force will have a representative on the board to ensure that rebranching is done fairly. The rebranching process now being tested will consider Other Than RA (OTRA) officers, using an order of merit list from the top, middle, and bottom thirds of the officer pool. It's expected that force alignment rebranchings will occur during FY 87 for the FY 84 group.

NCO careers need to be managed just as carefully as officers' careers. There is an Enlisted Personnel Management System (EPMS) study group now meeting to address this need. The Armor Center has published a pamphlet, "Armor Enlisted Professional Development," that describes normal career patterns, the present EPMS, and board procedures.

(Copies of the Pamphlet, USAARMC Field Circular 21-309, can be obtained by writing: Commander, USA MILPERCEN, Attn: DAPC-EPK-I, 200 Stovall Street, Alexandria, VA 22332-0400.)

Overall, the health of CMF 19 is improving. In MOS 19K, E-7 promotion opportunities are adequate, and in 19E and 19D, they are improving. A recent E-7 promotion board noted that too many NCOs are working out of their primary MOSs for too long a time, too many times in their careers. While one tour or occasional tours outside the soldier's primary MOS may be necessary to meet the needs of the army, extended or frequent tours are inadvisable. NCOs who had been away from troops for a long time were not considered as immediately qualified as were those who had more time with troops. Those who performed well in the tough troop environment did much better on the selection criteria. The board urges SSGs to seek the tough jobs with troops, perform well there, ensure that their photo is updated and uniform correct, review and update records religiously, work to raise their GT score over 100, validate their SQT, and complete military education successfully.

The Armor Center will continue to work these issues while developing plans to meet our future needs. As Chief of Armor, I really need your comments as we work on the specific programs and your active participation as we execute. Forge the Thunderbolt!



GUNNER'S SEAT

CSM John M. Stephens
Command Sergeant Major
U.S. Army Armor Center

Is the Master Gunner Competitive?

While visiting armor units in recent months, I found many noncommissioned officers who did not feel they had made the right decision when they elected to become master gunners. There are numerous reasons for these attitudes.

Many of these soldiers began with the feeling that master gunners were the elite of the armor force. It's an understandable attitude, given the demands placed on the NCO while he is attending the course. The standards are tough; almost is not good enough. It almost seems as if they want you to fail, which is far from the truth. These tough standards make the master gunner stand out from his peers as an NCO trained to a higher degree of proficiency in task skills than the tank commanders and platoon sergeants in his unit.

Should he be trained to a higher degree of technical proficiency? That question has come from every level of leadership, both officer and noncommissioned officer.

Many of the comments on this came from master gunners who are not being used in that role within their company or troop, and there are many. Some asked, "Why am I the target NCOIC?", "How can I become a platoon sergeant?"

It's tough being a platoon sergeant and a company master gunner while doing both jobs at the proper level of professionalism. The new change which moves the master gunner to the headquarters tank section should help. The more intensive gunnery training being given in BNCOC and ANCOC should also relieve some of the training burden the master gunner carries within his unit. More proficient tank commanders and platoon sergeants will allow the commander to point the master gunner in the direction he was trained for.

Gradually, we have been building the program to the point where there can actually be one master gunner per company or troop. There are now master gunners at all levels of command within FORSCOM, USAREUR, TRADOC, and MILPERCEN. This task has not come easily: master gunner classes are small because of resource constraints; there is a high attrition rate; and there were difficulties in the selection process.

Today, there are over 600 master gunners in the active force, although over 100 of these are E-8s and E-9s; some are command sergeants major. Since the decision has been made to put E-8s at battalion and brigade levels and E-9s at the separate brigade, regimental, and divisional level, the need for senior master gunners will increase.

The problem is, how does the master gunner remain competitive with his peers? You must have a successful tour as a 1SG to become a SGM, but how does an E-8 master gunner become a 1SG, and if he does, who will ensure that he remains in the job long enough to learn the demanding skills required at that position? I talked to one E-8 master gunner, serving as a 1SG, who told me that his training program was so good that he was moved to the battalion S-3 office with less than five months on the job as a 1SG. He never went back.

We have to ensure that all our E-8s serve as 1SGs because it is important to the Army's leadership system to have a progressive pattern of challenges with increased responsibility at the different levels of leadership. But the Chief of Armor and MILPERCEN must find a solution to the master gunner assignment problem: if a master gunner is serving as a 1SG, he is not performing the role of a master gunner and should not be counted as one. As the system now stands, a master gunner in a CSM slot is included in the unit's master gunner strength.

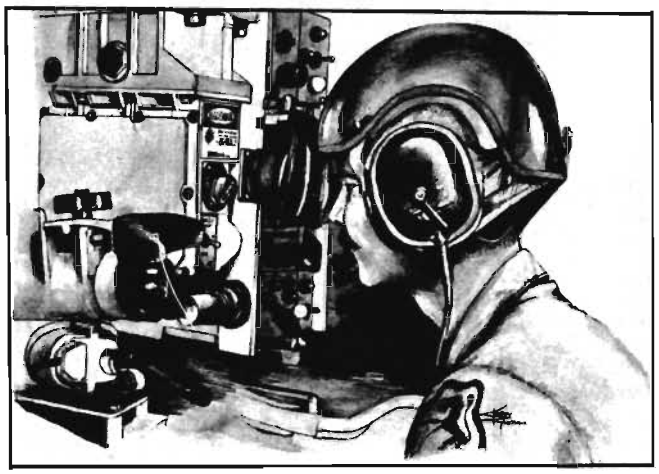
Let's look at the future of the program, keeping in mind that we will continue to train master gunners at the same class rate in both the Active and Reserve components.

Three to four years from now, I see an E-8 and E-9 master gunner strength of 400-500 and a total complement of 800-900 master gunners.

The last E-9 promotion list showed that master gunners were selected for promotion at about the same percentile as other armor E-8s. On the last E-8 list, E-7s who were master gunners did better than their peers. It will be interesting to see what pattern develops when the next E-7 list is published. Also remember that of the 57 E-8s selected for E-9, all had successfully served as 1SGs. If you don't serve successfully in a leadership position, you don't get promoted!

Getting back to the original question: Are master gunners competitive? The answer is yes, and they will become even more competitive as their numbers increase. But a master gunner must understand that the additional skill qualifier does not make one competitive. They must be proficient master gunners and noncommissioned officers. Challenging and demanding leadership positions await those who want to be successful. The professionalism of our NCO corps is the responsibility of our senior noncommissioned officers. It's a responsibility we learn by demonstrating our capabilities while assigned as platoon sergeants and first sergeants. By serving successfully in those positions, master gunners become even better leaders because of their additional skills.

First Lieutenant Mark E. Asbury
3d Brigade, 4ID, Fort Carson, CO



Making NETT Training Pay Off

New achievements in technology are the hallmarks of the *M1* and the *M1A1* tanks. The *Abrams* reflects the adaptation of high technology to the foreseeable future role of armor on the modern battlefield.

Force modernization not only involves the fielding of new technology, but the introduction of new concepts of operation. The new equipment training team (NETT) provides valuable assistance to help crew members understand basic operation and upkeep during the initial training phase. However, in order to achieve the maximum potential of new technology, crew members need additional training to assist in overcoming awkwardness or unfamiliarity in the performance of new or modified crew duties. Units anticipating transition to the *M1* or *M1A1* need to have their master gunners prepare and implement gunnery training programs that reinforce the new techniques learned during NETT training.

Crew proficiency and human factor studies of the *M1* have helped to identify some of the key areas to consider when planning gunnery training. The focus here will be on some of the more significant issues mentioned. Where applicable, proposed changes for the *M1A1* will be stated as well as possible training solutions.

One study showed that there was an awkwardness in the operation of the commander's weapon controls. While proposed changes on the *M1A1* would increase operator's performance, additional training still is suggested. Master gunners on the NETT team have suggested using a snake board with a boresighted *M55*.

The *Abrams'* improved stabilization system and suspension allows the vehicle to track a target while operating at speeds never before realized. When used with the multiple integrated laser engagement system (MILES), and after manually indexing "subdes 59", crews can practice engagements in the normal mode. This special feature designed into the *Abrams* blocks the output of ballistic solution, but induces the correct system parallax. However, realization of the crew's full potential to acquire and maintain target tracking skills while operating the *M1* near maximum terrain speeds have been limited by the size of the training areas and the absence of training goals that force the crews to perform to those standards.

Those planning tactical tables should consider an increase in stabilization engagements and in training crews to acquire and engage targets while assaulting and displacing. Furthermore, a good rule to remember when planning target locations is to approximate vehicle displacement at around 1,000 meters per minute in order to provide crews with ample time to accelerate up to 25 mph (670 meters per minute) before beginning engagement. Additionally, target acquisition training should place the commander in the protected open-hatch and closed-hatch positions, which are doctrinally considered as the primary hatch positions.

Proposed modifications on the *M1A1* may provide an independent thermal viewer with variable sector scanning and gunner's primary sight (GPS) lock-on capabilities to assist the commander's acquisition task.

Driving training has often been an overlooked subject during gunnery training, but new driving skills in stopping smoothly while operating under "tactical idle" require consideration in training in order to increase crew performance while moving from turret-down to hull-down positions and when moving into alternate fighting positions. Furthermore, evaluation of the *M1A1* has shown that it has a tendency to slide in turns while operating in muddy terrain. Additional training could be focused on FM 21-306 and video tape DAAPP No. 13110 TVT 17-110 TRADOC, "M1 Tank Driving" as initial resources.

While not mentioned specifically in studies, units currently using the *M1* have found that activation of the elevation decoupler has been a valuable resource for loading the main gun while moving. Though originally designed for use when clearing a jammed coax machingeun, it allows the gunner to still track the target while locking the main gun. In current

test models of the *M1A1* technicians are evaluating the feasibility of this technique by modifying the loader's panel to have an additional switch called "gun index" that will decouple the main gun from the GPS and index the gun to zero degrees.

Other areas not identified in studies, but mentioned by unit personnel and the NETT team, are use of the loader's weapon, the operation of the fire control system in degraded mode, and troubleshooting operations with the TM.

Finally, Army Wide Training Support (AWTS) currently has several publications that can assist. Some of the more applicable are:

FM 17-12-1, Tank Combat Tables, *M1* (Final Draft); *ABRAMS*, Characteristics & Description Book, M1 Tank, by General Dynamics; TC 17-12-1, Handbook for Sight Picture Training M1 Tank, (Draft). These publications can be ordered in limited quantities from: Commander, USAARMC, ATTN: ATZK-DPD-NRT-AWTS, Fort Knox, Ky, 40121-5000.

With the introduction of the *Abrams*, the concept of weapon system proficiency is no longer the ability of a tank crew to quickly place steel on target; instead, it is a combination of crew gunnery and tactical skills to effectively fight and survive. (See "Integrating Tactics in Gunnery Training," this issue. Ed.) Therefore, effective operation with the *Abrams* in creating the desired shock effect on the modern battlefield is conditional on the crew's thorough familiarity and ability to apply all its functional capabilities to include techniques of acquiring targets and effectively employing all crew-served weapons.

Units making the transition to the *Abrams* need to consider the additional training following NETT training to enhance and reinforce new skills learned.

Master Gunner Contacts Realigned

The Master Gunner Contact Program has been realigned to advise active Army units and Readiness Groups. The following list of contacts supersedes the list published in the last issue of ARMOR Magazine.

Overseas

Unit	Primary	Alternate
8th ID	SFC Patterson	SSG Graves
3d AD	SSG Coxey	SSG Porter
1st AD	SFC Barker	SFC Manley
3d ID	SFC Russell	SFC Spurling
2d ACR	SFC Dean	SSG Vann
11th ACR	SFC Francois	SFC Russell
Berlin BDE	SFC Spurling	SFC Manley
1st ID (FWD)	SSG Porter	SFC Lopez
7th ATC	SFC Lopez	SFC Gooch
2d AD (FWD)	SFC Drake	SFC Russell
2d ID Korea	MSG Hendricks	SSG Hinkel
England	WO Chaplin	SSG Preston
Canada	WO Wonderham	SFC Manley

Readiness Group

Region	Primary	Alternate
Ben Harrison	SFC Russell	SFC Patterson
Bragg	SSGT Eul	SFC Patterson
Buchanan	SFC Lopez	SFC Dean
Denver	SSG Vann	SFC Francois
Devens	SFC Drake	SFC Manley
Dix	SFC Patterson	SFC Barker
Dobbins	SFC Manley	SSG Hinkel
Douglas	SFC Dale	SSG Graves
Gillem	SFC Dale	SSG Ballinger
Indiantown Gap	SSG Coxey	SFC Gooch
Jackson	SSGT Eul	SSG Ballinger
Knox	SFC Russell	SFC Spurling
Lee	SFC Barker	SFC Drake
Lewis	SSG Hinkel	SFC Spurling
MacArthur	SFC Gooch	SFC Lopez
McCoy	SSG Coxey	SFC Francois
Meade	SFC Dean	SFC Graves
Oakdale	SFC Dale	SFC Manley
Patrick	SSG Vann	SFC Lopez
Presido	SFC Gooch	SFC Dean
Redstone	SFC Russell	SFC Spurling
Sam Houston	SFC Spurling	SSG Vann
Selfridge	SSG Graves	SSG Hinkel
Seneca	SFC Francois	SFC Barker
Sheridan	SSG Coxey	SSG Ballinger
Shilling Manor	SSGT Eul	SSG Graves
Sill	SFC Drake	SFC Dale
Snelling	SSG Hinkel	SFC Manley
Stewart	SFC Spurling	SFC Dean
St. Louis	SSG Ballinger	SFC Lopez

USA

Location	Primary	Alternate
Ft. Irwin	SSG Hinkel	SSG Graves
Ft. Knox	SFC Russell	SFC Patterson
Ft. Hood	SFC Spurling	SFC Russell
Ft. Bliss	SFC Dale	SFC Lopez
Ft. Riley	SSG Vann	SFC Dean
Ft. Lewis	SSG Graves	SSG Hinkel
Ft. Bragg	SFC Patterson	SSG Coxey
Ft. Carson	SSG Porter	SFC Patterson
Ft. Polk	SFC Dean	SFC Drake
Ft. Benning	SFC Dale	SFC Drake
Ft. Sill	SFC Drake	SFC Gooch
Ft. Stewart	SFC Lopez	SFC Spurling
Hawaii	SFC Manley	SSGT Eul
US Marine Corps	SSGT Eul	SSGT Eul

ARMOR Back Issues

Subscribers frequently wish to purchase back issues of ARMOR that they have missed or misplaced. This page can be used as an order form by checking the appropriate boxes. Each listing includes the titles of major articles in that issue. Many other issues published prior to 1982 are also available on request, but some are now out of stock. The following recent issues of ARMOR are no longer available:

SEPTEMBER-OCTOBER 1982 **JANUARY-FEBRUARY 1983** **MARCH-APRIL 1983**

☐ **JANUARY-FEBRUARY 1982**

Tank Gunnery Qualification in the 1980s...The Armored TF in the Hasty Attack...The Adiabatic Engine Revolution...Dimensions of Mobility...The Armor Force in the AirLand Battle...The Best Tank Ever Built...Ground Mobility in Perspective...Defense of the Reich — Two Battles.

☐ **MARCH-APRIL 1982**

Armor Conference Agenda...German Tank Gunnery...The Future of Diagnostics...Continuous Operations...Three D's of Reconnaissance...Armor Aviation...The Army's Black Tank Battalions...British Army Introduces the Challenger...The Division 86 Maintenance Platoon.

☐ **MAY-JUNE 1982**

Thunder in the Desert...Do We Know How Good Our Tank Crews Really Are?...Operation Badr: Crossing the Suez...The Bradley Versus the Opposition...Ivan Has Training Problems...Fighting the Threat Advance Guard...Armor Technology: Part I.

☐ **JULY-AUGUST 1982**

The Future of Swedish Armor...New Tank Gun Calibration Policy...Weapons Versus Armor, a New Approach...Armor Operations in Built-Up Areas...1982 Armor Conference Report...The Battle of Kursk...Combat Service Support...The Armor Force's Manpower Bank.

☐ **NOVEMBER-DECEMBER 1982**

Tactical Use of Frozen Waterways...Engines for Combat Vehicles...Tactical Control of a Passage of Lines...Armored Combat Vehicle Technology...Marine Armor and Prepositioned Forces...The Soviet Tank Mystique...Standard Prepare-to-Fire Checks...Sidi Bou Zid: A Case History of Failure.

☐ **MAY-JUNE 1983**

Battle of El Firdan...Armor Training Simulators...Wartime Soviet Tank Formations...The LHX Pursuit Squadron...Attacking the Attacker...Italian Armor...Armor Technology IV.

☐ **JULY-AUGUST 1983**

First U.S. Tank Action of WWII...Improving Combat Crew Survivability...Broad and Narrow of It...Allied Armor Training in Canada...Armor Conference 1983 Report...Economy of Force — The Cavalry Connection.

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Task Configuration for Fighting Vehicles...The Soviet Mechanized Corps of 1941...Counterattack Planning...Leading a Platoon on the Integrated Battlefield...Improved Company Command and Control...Elements of Tank Design...The Training Revolution.

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☐ **MARCH-APRIL 1984**

Adding a Third Dimension to Terrain Analysis...Tank Test Beds...Living With Tanks...Toward an Old Way of thinking...Armored Regiments of the U.S. Army...Back-to-Basics Gunnery...Oran, 1942.

Back Issues are available for $2.50 each from:

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P.O. Box 607
Fort Knox, Kentucky 40121

(To charge on MASTERCARD or VISA, include account number and expiration date.)

RECOGNITION QUIZ

This Recognition Quiz is designed to enable the reader to test his ability to identify armored vehicles, aircraft, and other equipment of armed forces throughout the world. *ARMOR* will only be able to sustain this feature through the help of our readers who can provide us with good photographs of vehicles and aircraft. Pictures furnished by our readers will be returned and appropriate credit lines will be used to identify the source of pictures used. Descriptive data concerning the vehicle or aircraft appearing in a picture should also be provided.

(Answers on page 48)

World War I tank corps crewmen lubricate their Renaults prior to their first commitment to combat in WWI.

Armor's First Struggle

by Captain Edward G. Miller

Tactics, doctrine and technology are inexorably linked; they are interdependent factors in weapons development, the level of any one depending to a great degree on that of the other two. In addition, the funding of a system, resistance by established groups to change, and the struggle for control of the proponency for a weapons system are additional factors that set the parameters within which a particular weapons system is developed. For example, the AirLand Battle, the High Technology Test Bed, new organizations such as Division 86 and the related tactical and logistical matters such as strategic deployability are all affected in numerous ways by the external forces noted above.

This article will briefly trace the development of U.S. armor doctrine and the establishment of the armor branch during the period 1918-1941 as an example of what might occur within an organization when both new concepts and equipment are concurrently tested and adopted.

In the first World War, the tank proved itself as a new and potentially tactically decisive weapon, even though tanks normally performed only infantry support roles — partly because of doctrine and partly because of mechanical limitations.

The tank's early supporters at influential levels were few, but officers at lower echelons were usually eager to prove its potential. They fought to prove the usefulness of the tank in roles formerly occupied by older weapons and arms. Because the tank was a new weapon, its backers were initially perceived as threats by the established arms. Infantrymen saw the tank as a weapon with the ability to cross trenches and offer protection to foot soldiers; many cavalrymen saw the tank as a tool to aid in restoring battlefield mobility to their arm.

Shortly after the end of the war, the Army undertook a number of studies of the lessons of that war. On 11 December 1918, the Westervelt Board was established at the direction of the War Department. It was to study the use of the field artillery in the war and make recommendations on its future use. Its report noted that: ". . . mechanical transport is the prime mover of the future."

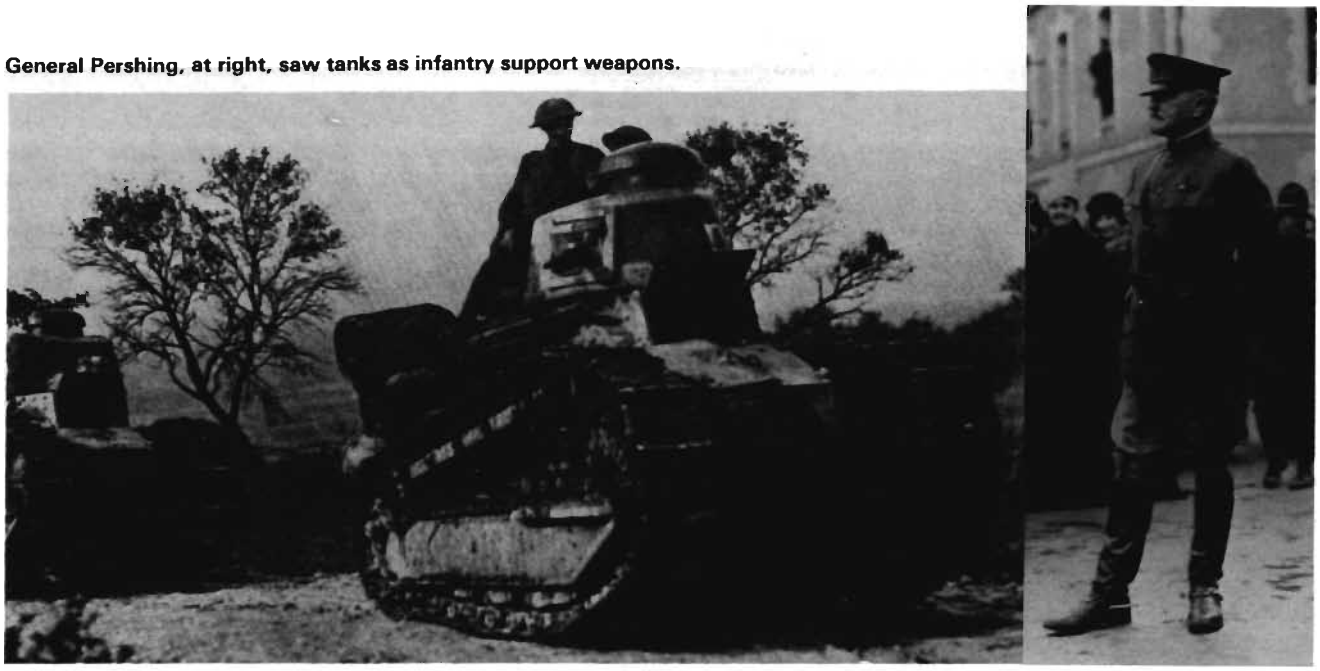
The so-called Superior Board convened on 19 April 1919, to study the lessons of the war as they affected the tactics and organizations of the combat arms. Established by Headquarters, American Expeditionary Forces, its report recommended that: ". . . tanks should be recognized as infantry supporting and accompanying weapons." This report was endorsed by General Pershing and therefore it carried great weight in influential circles.

Also, during the immediate postwar months, officers were influenced by a paper prepared by Brigadier General Samuel D. Rockenbach, wartime commander of the Tank Corps. Dated 18 August, 1919, it called for: "a tank with a weight of 18 tons, a top speed of 12 mph and for it to be protected against AT rifle fire." Although the specifications for the vehicle were approved by the Ordnance Committee in November 1919, Rockenbach failed to produce any additional definitive ideas for the employment of tanks. Unfortunately, for pro-tank elements, this paper became the only policy statement made by the Tank Corps.

At that time, practice was for the using arm to set the tactical requirements for a weapon, based on War Department guidance, and for the Ordnance Department to design a weapon within those requirements. The Westervelt Board, a body with power to recommend guidance to the Army staff, did not offer any official statement regarding tank design. Thus, the Rockenbach paper, which, for the most part, simply reflected the tactics of 1918: an Ordnance Department guidance, and a memo prepared by Major R.E. Carlson dated 1 August 1919, were the only official Tank Corps policy statements to emerge before mid-1920.

No policy was established to represent the interests of the Tank Corps as did the report of the Superior Board for

General Pershing, at right, saw tanks as infantry support weapons.



the infantry. This lack of legitimate policy foundation led, in part, to the disbanding of the Tank Corps under the National Defense Act of 1920 and the infantry gained control of the tank development program.

In an article published in the July 1921 issue of the *Cavalry Journal,* Major Bradford Chenowyth stated that by 1921 the army had ". . . patiently endeavored to adjust the newly-acquired technology to the framework of pre-war principles." Although infantry tanks were the only tanks then in the inventory, Chenowyth believed that the tactical future of the tank lay in adapting it to the cavalry, because that arm would need the tank in order to develop its ability to concentrate on the battlefield. The tank could give the cavalry greater mobility and power to accomplish its mission, and (Chenowyth, an infantry officer, might have stated this to appease cavalrymen), the tank could be employed as a "natural auxiliary to the horse."

In a follow-up article in the same issue, Major George S. Patton, Jr. — while not agreeing with every point made by Chenowyth — did cite the need for a separate tank corps as a mobile GHQ reserve. Chenowyth's article, "Cavalry Tanks,"[1] was a glimmer of farsightedness at a time when many officers were unable to comment publicly on the topic without endangering their careers.

During the 1920s and 1930s, development was also hampered by limited appropriations for research and development: ideas could not be tested without funds for pilot vehicles. In addition, doctrine was in many ways dependent upon the capabilities of the vehicles then in service or under test. It also depended upon tactics, which were, in turn, dependent upon the capabilities of the vehicles.

The official statement of doctrine at that time was the Army's Field Service Regulations. According to the 1923 edition, the infantry was essentially the arm of close combat: "This role, rather than the nature of its armament, distinguished the infantry as a combatant arm." The infantry was equipped with tanks ". . . for dealing with resistance which is protected against the effects of *other* (my italics) infantry weapons." The cavalry, on the other hand, was "characterized by a high degree of mobility and by a relatively reduced firepower in proportion to the means employed." The special value of the cavalry lay in its ability to rapidly displace firepower. Cavalry also possessed the ability to conduct delaying actions to a considerable depth, and it depended upon its ". . . rapidity of maneuver, . . . and the effectiveness of the means employed to deceive the enemy as to its own dispositions and intentions."

Thus, during the 1920s, the infantry became fully committed to the accompanying role for tanks because it was believed that they were infantry weapons whose primary role was to accompany the foot soldier and to overcome the resistance of an entrenched enemy. The cavalry was to provide security for the advancing infantryman.

In 1928, the Secretary of War, Dwight F. Davis, issued guidance for the establishment of the Experimental Mechanized Force, (EMF) a unit similar to that which he observed in Britain in 1927:

"It should not be considered as a divisional unit, but rather, because of its special characteristics, as a force of special mission, in the accomplishment of which troops of infantry or cavalry divisions will cooperate."

Commanded by Colonel Oliver Eskridge, the EMF was the first post-WWI attempt by the army to organize a unit with mechanized elements as the central arm. It was established in order to develop the equipment and doctrine for the mechanization of additional units, and despite no new official policy statements from the War Department, it did have the backing of the Secretary — which was quite sufficient for at least an operational test.

During the summer of 1928, the EMF practiced night marches, flanking attacks, approach marches and advance guard missions.

It was realized by some that the tank was essentially an offensive weapon possessing strategic mobility which could be used to seize and temporarily hold key terrain and attack lines of communication. One officer noted in his after-action report that the object of mechanization was "increased strategic mobility (to) restore mobility to the battlefield and to provide greater speed, power and weight in a decisive attack." The tank would, ". . . become the principal weapon which all other elements (would) support."

Although the EMF was plagued by vehicles which were mechanically unreliable and too slow for the tactics envisioned, a number of lessons were learned that summer which will be of interest to the contemporary tanker.

French infantry ride to the front on a St. Chamond, a heavy tank for its day.

The need for chemical protective clothing and masks was established, as were the requirements for air guards and 50-meter spacing between marching vehicles. Mobile CPs were used for command and control, and it was also noted that blue-filtered lights would be useful at night. Each march unit carried a day's supply of classes I, III, and V and another day's supply was carried with the trains. In addition, a mission was found for the light tanks: a more heavily armed (and armored) replacement for armored cars.

Major C.C. Benson wrote that mechanized forces offered: ". . . many and higher level commanders an additional weapon which would combine firepower, shock and speed to a higher degree than now exists in any one combatant arm."[2]

Although the EMF was disbanded in October 1928, it represented a turning point in the mechanization issue. The question would no longer be whether to mechanize, but it would center on which branch would retain proponency over mechanized units. A base from which further policy and doctrine could be developed had at last been field tested. Soon after the EMF was disbanded, Major General Stephen O. Fuqua, the Chief of Infantry, made it clear that the infantry would remain the primary ground gaining arm and he was determined to retain control of the tanks.

The Mechanized Board, which was established in the spring of 1928, issued its final report shortly after the EMF was disbanded. The board recommended the creation of a similar unit comprised of the combined arms. Brigadier General Frank Parker, War Department G3, backed the proposal, and all branch chiefs concurred with the exception of General Fuqua.

In 1929, the Chief of Staff, General Charles P. Summerall, issued a directive which ordered the creation of the new mechanized force. Although some foreign advocates called for tank-pure units, the War Department realized that tanks could not effectively operate entirely alone. The new force introduced mechanization into the entire Army and it travelled throughout the nation until it, too, was disbanded in the summer of 1931.

By 1932, many cavalrymen realized that their branch would eventually mechanize and they would have to give up their horses. Summerall's successor, General Douglas MacArthur, in his "General Principles to Govern in Extending Mechanization Throughout the Army," stated that the cavalry should retain its traditional missions while substituting tanks for horses. He did believe, however, that, considering the financial constraints of the day, each branch should develop its own mechanization policy. Tanks could continue to be developed for the infantry, but they were to be adapted to the cavalry. MacArthur's ideas did give some new power to the proponents of the tank, although the proponents did not immediately get a separate branch.

In 1935, maneuvers were held at Ft. Riley, Kansas, which for the first time, pitted a fully mechanized unit against horse cavalry, and it was realized that the tank was capable of performing the same missions as horse cavalry. The final after-action report did stress, however, that a powerful force could be produced if both horse and mechanized units cooperated as one.

In an address at the Cavalry School in the summer of 1935, then Lieutenant Colonel Jonathan M. Wainwright noted that ". . . mobility has ever been the watchword of the cavalry. This mobility must not only be the physical but as well the mental mobility of the cavalryman, combined with the mobility of the horse and of the armored fighting vehicle." He also noted that, considering all types of terrain, the horse remained the most mobile mount of the cavalryman.

Speaking to a class at the Army War College, Major General Leon Kromer, the Chief of Cavalry, stated that the horse could assist the tank in much the same way that tanks were of assistance to the infantryman.

In a 1937 lecture at the War College, Colonel Van Voorhis acknowledged that within the Army there was indeed a wide difference of opinion as to a suitable mission for mechanized forces. He stated that the strength of these units lay in rapid movement combined with maneuver and superior firepower. Properly developing these assets was one of the major problems then facing the army. The War Department had previously stated that the value of mechanized cavalry was its ability to conduct distant reconnaissance and to provide divisional and higher level commanders with an exploitation weapon. As foreign developments, particularly those in Germany, came to light, American exponents realized that their ideas were fundamentally sound, but that limited funds and the competing interests of the cavalry and

Renaults come off the assembly line in France during WWI.

infantry were inhibiting progressive development.

In late 1938, the Mechanized Cavalry Board was established at Fort Knox, Kentucky, and it initiated an orderly system of establishing technical requirements, consulting with the War Department staff, and the field testing of prototypes. Many officers felt that the limited funds which were appropriated for research and development might be better spent on designing and testing of pilot vehicles with the belief that when and if war came, a useful vehicle, based on prototype designs, could be quickly mass-produced.

Major General Kromer retired in 1938 and he left the decisions about the mechanization of the cavalry to the General Staff. The power vacuum which was produced, coupled with the lack of a firm tank/horse doctrine and a definite TOE for such a unit, led Van Voorhis and others to believe that a separate mechanized arm might have a chance of acceptance if it was soon established; i.e., before conservative forces had a chance to react. Van Voorhis realized that he must act quickly, because a new debate was brewing which concerned the basic roles of the cavalry. Proponents at Ft. Knox favored a battle role, while elements within the War Department favored an auxiliary role. The new Chief of Cavalry, Major General John K. Herr, supported the idea of a few mechanized cavalry units as long as no horse units were disbanded to support the conversion. (Even after the German campaign in Poland, Herr stated that the machinegun would not eliminate horse cavalry.)

In late 1939, as the lessons from the recently conducted maneuvers near Plattsburgh, N.Y., were being studied, consideration was finally given to the establishment of a mechanized cavalry division. The next year, a panel consisting of Brigadier General Adna R. Chaffee and others recommended the establishment of a separate armored force. Herr, upon being given these recommendations, stated that he would accept armor as a part of cavalry, but again, he would not sacrifice any horse unit in favor of a mechanized unit. Chaffee and the others were not deterred, and on 10 July, 1940, the Armored Force was created, and Herr had missed his chance to retain tank units as part of the cavalry.

Shortly before his death in 1941, Chaffee, during testimony before Congress, noted that the 1940 German campaign in France was an excellent example of the use of an armored army. "The tactical action of the armored division is based on the fire and the movements of the (combined arms). This tactical action is not comparable to the cavalry charge as so many erroneously believe. It is the natural use of. . . firepower to assist. . . the movement of the maneuver element."[3]

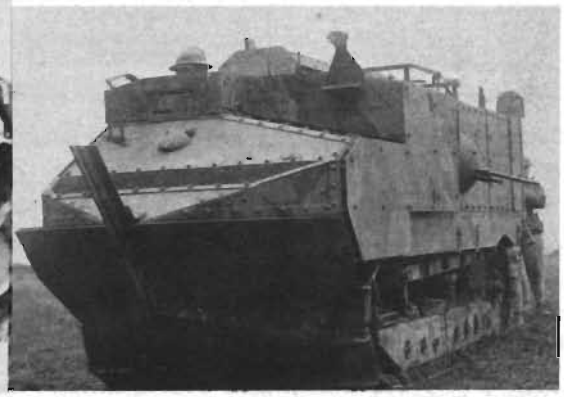
He felt that the lessons of that campaign centered on the efficient use of armored assets, because tanks were an additional weapon, not a substitute for the basic arms. He also noted that during the 1920s and 1930s, the Army should have defined a mission for tanks and created a force to accomplish that mission — rather than just fit a mission to whatever equipment might have been on hand. He noted that by 1935, the mechanized force had developed into an organization with organic reconnaissance and machinegun units, and that by 1941 the force had developed into an organization in which the maneuver units were combined arms organizations. It was also realized that mechanized reconnaissance units had a great long-range value and that commanders should place their reconnaissance assets well to the front of the main body until contact was made. To win, mobility did not just only imply maneuverability but rather, mobility was a form of maneuver within the battle area by highly mobile forces.

In the new Field Service Regulations, published in 1941 under the title FM 100-5, "Operations," tanks were to be employed to assist the ". . . advance of infantry foot troops, *whether preceding or accompanying the assault echelon.*" (my italics). Cavalry, characterized by high mobility, could bring a new depth to the battlefield with its mechanized units which could intervene at the decisive point and exploit any breakthroughs made by the infantry.

By the time of the entry of the U.S. into WWII, mechanization had been fully forced upon the Army, but some believed even then that its effects had not been fully realized. Thus, the Army entered a new era of warfare, finally, but perhaps not totally realizing the potential of the tank.

Doctrine and weapons systems which have been designed to employ that doctrine, are sometimes incapable of supporting one another — that is, they are mismatched. In the case of the Mechanized Force and later, the Armored Force, the tanks designed and under service testing during the interwar years were seldom capable of

Major George S. Patton, at left, with a Renault. Below, a St. Chamond mounting a side-firing machine-gun.



fully executing the mechanized doctrine under study. The technical limitations of U.S. tanks of the period were caused by a number of factors including limited appropriations for research and development, and the automotive technology of the time. In addition, even the size of the vehicles was limited by the capacity of engineer bridges.

Doctrine and technological limitations were thus caused by a number of factors both within and without the Army. The other major obstacle confronting American armored theorists and designers of the period was the struggle for the proponency of the tanks as an arm.

Initially, the infantry controlled tanks because of contemporary doctrine and because it won control of the tanks after the passage of the National Defense Act. As doctrine developed to what we now associate with mechanized arms, progressive cavalrymen and other officers sought to adopt tanks for their own branch. While conservative officers battled among themselves for the proponency of what they recognized as an entirely new branch, Chaffee, Van Voorhis and others recognized an opportunity to establish the new branch. Nevertheless, it would be some time before the U.S. developed an adequate medium tank to use a doctrine which had developed at a far faster pace than did the weapon with which the doctrine would be used. Even new and potentially decisive weapons are often misunderstood in the rush to develop doctrine for their use — or to justify their existence.

The early developmental period of U.S. armor offers contemporary soldiers an excellent study of what often happens to a new, developing organization when both its concepts and its equipment are concurrently developed and evaluated in a rather unfriendly atmosphere.

Futher Reading

Additional sources available to the student of the development of US armor include:

Organize a Mechanized Force, by Colonel (Ret.) H. H. D. Heiberg, Patton Museum Library, Ft. Knox, Ky. A condensed version appeared in *ARMOR* Magazine, Sept-Oct. 1976.

"The Demise of the Tank Corps and Medium Tank Development Program," by George F. Hoffmann, *Military Affairs,* February 1973.

"Tactics vs Technology," by Hoffman, *ARMOR* Magazine Sept-Oct. 1973.

In The Wake of the Tank, by General Sir Gifford Martel, Sifton, Praed & Co. Ltd., London 1931.

The Blitzkrieg Story by Charles Messenger, Charles Scribner's Sons, New York, 1976.

"The Development of American Armor 1917-1940," by Timothy K. Nenninger, four parts, Jan to Oct 1969 *ARMOR* Magazine.

"Mechanization of the Army," by Lieutenant Colonel A.R. Chaffee, unpublished typescript, USAARMS Library, Ft. Knox, Ky.

"Mechanized Cavalry," by Lieutenant Colonel Willis D. Crittenberger, unpublished paper dated 17 Nov. 1938, USAARMS library, Ft. Knox, Ky.

"Report of the Experimental Mechanized Force, 1928," by Colonel Oliver S. Eskridge, unpublished, USAARMS Library, Ft. Knox, Ky.

Footnotes

[1]Chenowyth, Maj., Bradford, "Cavalry Tanks," *Cavalry Journal,* July 1921.

[2]Benson, Maj., C.C., *Memorandum to the Commander, Experimental Mechanized Force,* 21 Sept. 1928. USAARMS Library, Ft. Knox, Ky.

[3]Chaffee, MG, A.R., *Statement of Major General A.R. Chaffee, the Commanding General of Armored Forces, U.S. Army, to the Congressional Subcommittee on Appropriations.* Unpublished, Washington, D.C. 14 May 1941. USAARMS Library, Ft. Knox, Ky.

CAPTAIN EDWARD G. MILLER is a graduate of Western Kentucky University. He served as a tank platoon leader and company XO in the 194th Armored Brigade and as aide-de-camp to the CG, 2ROTCR. In 1983 he received a branch transfer from armor to ordnance. He is a graduate of the AOBC, JOMC and the Ordnance Officer advanced course. He was later assigned to the Aberdeen Proving Ground and is now serving with 2d Support Command, USAREUR.

The height range of U.S. tankers is obvious in this photograph of 5-foot, 3-inch SP4 Curtis Johnson, right, and 6-foot, 4-inch SSG Derick McElveen, both of 5-73rd Armor at Fort Knox.

Big Men and Tanks

by Ronald W. Cammarata

Military designers are constantly striving to maximize the battlefield survivability of army materiel. In the area of tank design, conventional wisdom has dictated that one way of achieving increased survivability is to present the smallest target area to the enemy. Accordingly, designers have for some time looked for new ways to reduce tank heights.

It has been suggested that one way to achieve a reduction in the height of combat vehicles is to limit the maximum allowable size of crewmen. The assumption is made that smaller crewmen will allow for smaller tanks. However, restricting the crewmember height would have little effect on the size of tank silhouettes. Rather, it would serve only to decrease the size of the pool from which capable crews could be drawn.

Army combat vehicles are designed to accommodate crewmembers who range in size from the 5th to the 95th percentile of male soldiers. The 95th percentile U.S. Army male is 73 inches tall. Soviet crewmembers are, on the other hand, smaller than their American counterparts; Soviet tankers have a general height of 66 inches.[1]

Despite the generally shorter height of the Soviet Army tank crewmembers, that height differential is not reflected in the height differences of the crew compartments of Soviet and American tanks. Though the U.S. Army *M1 Abrams* tank is 6.5 inches greater in height than the Soviet *T-72* main battle tank, the crew compartment in the *Abrams* at 65 inches is only 1-inch higher than the 64-inch high crew compartment of the Soviet *T-72*.

Most of the 6.5 inches difference in the heights of the *T-72* and *M1* tank. can be accounted for elsewhere. The ground clearance of the *M1* is 2.5 inches greater than the *T-72* and it has 3 inches more space under its turret to accommodate a rotating turret floor. These differences account for 5.5 inches of the total 6.5 inches difference in the height of the two vehicles.

Limiting the height of tank crewmembers to men smaller than the 95th percentile would influence the height of the crew compartment only if there is a significant difference in the seated heights of crewmen and then only if the seated height of a crewman were the only factor that determines the required height of the tank.

Conventional seats with straight backs used most often in army vehicles tend to maximize the height differences of seated crewmen. The sitting height of an arctic-clothed 95th percentile Army male is 39.9 inches. The same dimension for a 50th percentile arctic-clothed Army male is 37.3 inches, a difference of only 2.6 inches. (Most proponents for reducing the allowable size for a tank crewman suggest the 75th percentile U.S. Army male, or larger, as the maximum. The 50th percentile army male size is used here as a worst case.)

For conventional seating arrangements, MIL-HDBK-759 (military handbook) recommends a seat height of 6 inches minimum and 15 inches maximum and a minimum seat-to-ceiling distance of 42 inches for all crewmen. If the space necessary to

accommodate the seated crewmen were the only criterion that determined the height of the crew compartment, then the suggested minimum height of 48 inches —6 inches plus 42 inches —is a full 17 inches less than that available in the M1 tank —and 16 inches less than in the *T-72* tank.

The supine position reduces the height, as well as the height differences, of seated crewmen compared to the more conventional upright seating arrangement. Although MIL-STD-1472C (military standard) and MIL-HDBK-759 provide no guidelines for the supine position, U.S. Army Human Engineering Laboratory Letter Report 243 recommends dimensions for a supine seating arrangement.[2] Restricting the size of crewmen to percentiles less than the 95th when employing the supine position reduces the required height of a crew compartment less than the same restriction when employing conventional seating arrangements.

If a tank were to be designed to achieve the absolute lowest silhouette possible and tank crewman height were the only criterion used to determine the overall height of the tank, then the maximum reduction in height that could be achieved by limiting the size of crewmen to the 50th percentile male soldier, as opposed to the 95th percentile, would be the difference in the seated height of the two percentiles, about 2.6 inches. The reduction would be only 1.5 inches if the limit were the 75th percentile male soldier. If the turret floor is necessarily 20 inches above the ground because of other restrictions, then the lowest ceiling height of a tank that could accommodate a 50th percentile arctic-clothed Army male soldier using conventional seating would be more than 63 inches high.

The same tank, designed for a 95th percentile male soldier, would be nearly 66 inches high. (The lowest ceiling heights that would accommodate each percentile soldier are determined by adding the soldier sitting height to the tank's floor height of 20 inches and the minimum seat height of 6 inches.)

This means that designing for the smaller man would reduce the total height of such a tank by only 2.6 inches, or, at the most, 3.9 percent. The differences between the 95th percentile male soldier and soldiers of percentiles greater than the 50th (like the 75th or 80th) would affect the height of such tanks by even smaller percentages.

The firing height of the *M1* tank (the centerline of the gun tube when the gun is level) is 74.4 inches above the ground. The turret floor is 24 inches above the ground. When the gun is level, there are 50.4 inches from the turret floor to the gun breech. As a result, the breech of the level gun sits higher than the absolute lowest minimum height required for a seated 95th percentile male crewman. Additionally, U.S. Army requirements demand that a tank gun must be able to be depressed 10 degrees and fired. For a gun whose breech extends back 50 inches from its trunnion, the height of the crew compartment ceiling would need to be 7.8 inches higher than the gun's center line for the gun to be depressed 10 degrees. To load a round at 10 degrees depression, like the 105-mm HEAT which is 39 inches long, an additional 6 inches in the height of the crew compartment is necessary. If, for example, the center gun line of a hypothetical tank is 74 inches from the ground and the turret floor is 24 inches above the ground, to load a 39-inch round into a gun whose breech extends 50 inches from the trunnion, the height of the crew compartment would have to be 64 inches. That is sufficient to accommodate a seated 95th percentile U.S. Army male.

Theoretically, the ideal combat vehicle should be as low to the ground as possible. In practice, however, it is sometimes not advantageous to have a low tank. Field Manual 17-95, "Cavalry," states that, because the larger silhouette of American tanks enables their main guns to be depressed more than Threat tanks with smaller silhouettes, the American tanks can be concealed better when shooting at targets below them. In addition, a tank commander who sits too low to the ground may have severely restricted visibility. Although theoretical line-of-sight must exist simultaneously between any two points, the search capabilities of a taller tank in an environment with many low obstacles will be greater than those of a shorter tank. Crewmen within the taller vehicle might be able to spot a portion of the smaller tank while barriers would prevent crewmen in the shorter vehicle from acquiring the taller tank.

The ideal height of a tank will be determined by the terrain on which it is operated, and by the tactical use of this terrain. The most advantageous height for a tank in use in the desert would not necessarily be best for one operated on hilly or forested terrain. The ideal height of an overwatching tank in hull defilade may be different from that of an ambushing tank in turret defilade or a tank attacking through high brush. Although it would be unrealistic to build a different height tank for each battlefield condition, these are the types of considerations, and not crewman height, which should determine the height of tanks.

Footnotes

[1]Details of the Soviet *T-72* battle tank. (1980). *International Defense Review*, Special Series -11, 31-34.

[2]Keesee, R. L., Dickinson, N.F., & Wiegand, D.B. (1978). *Prone and supine crew positions in tracked vehicles* (Letter Report 243). Aberdeen Proving Ground, MD: U.S. Army Human Engineering Laboratory.

RONALD W. CAMMARATA is a mechanical engineer on the Combat Vehicle Systems Team in the Close Support Directorate at the U.S. Army Human Engineering Laboratory, Aberdeen Proving Ground, MD. He received his BS degree in engineering from The Johns Hopkins University, MD in 1981.

Preventing Combat Vehicle Injuries

by June Greer

An observer in the crew hatch of this M113 was killed when the vehicle overturned on a washed-out tank trail. The cargo in the carrier shifted as the vehicle overturned, pinning the soldier and ultimately suffocating him.

An Accident Report:
Cargo Crushes Soldier as M113 Flips

The crew of an *M113* was sent on a night scout mission to locate "enemy" positions. The crew consisted of the platoon sergeant, tank commander, driver and observer. The driver and the TC were in their positions; the platoon sergeant and observer were both in the crew hatch.

There was minimal natural illumination and the driver was operating with no lights. The vehicle was being operated on an improved tank trail. As the driver approached a dry wash or creek bed, he ran off a 5- to 6-foot vertical drop where the trail had been washed away by rains.

The APC rolled to an inverted position. The APC as kept from lying flat on the ground by the MILES transponder support pole which dug into the sand of the dry washout. The driver was temporarily trapped at his position by his Mission Oriented Protective Posture (MOPP) boots. He freed himself but could not exit through the driver's hatch, so he walked through the vehicle and left through the rear door.

The TC was held by an *M60* machinegun which hit the ground first and which — along with loose objects from inside the APC — blocked his way out of the track. The platoon sergeant, who was thrown from the crew hatch, moved the *M60* gun so the TC could exit.

The observer was lying with his head and shoulders outside the cargo hatch and the rest of his body inside the APC. Unsecured cargo in the body of the carrier fell on top of the observer and became lodged against his chest. This cargo pinned the observer to the roof of the compartment and caused him to suffocate.

Today's armored vehicles provide ingenious solutions to the changing needs of the battlefield. From tracked running gear designed for quiet, high-speed travel, to air filtration systems, modern armor has been devised to achieve the highest possible degree of protection against an enemy in battle. Soldiers fight more effectively and are better protected.

Technology, however, does not protect soldiers against their own mistakes, and these can result in serious or fatal non-combat injuries.

In fiscal year 1984, 17 soldiers died in tracked vehicle accidents. In addition, there were 381 non-fatal injuries. The cost of combat vehicle or tracked vehicle injuries was $2,222,090: non-fatal injuries accounted for $1.4 million of this and fatal injuries cost the Army $799,000. However, these are only the direct costs of the injuries.

Fatal accidents are investigated and from these investigations come preventive measures to ensure that the same injuries don't happen again. But non-fatal injuries are too often considered "the cost of getting the job done."

This cost can be quite a drain on supervisors, commanders, and the Army, and far exceeds the computed lost time of the injured or deceased soldier. Someone has to fill the soldier's position, often leaving another position unfilled. Add to this the cost of men and equipment to evacuate the injured soldier, hospital personnel and equipment to treat the injury, and personnel to attend to the administrative details. Every injury saps a commander's ability to do his job. Injuries are both time consuming and expensive.

Monotonous Repetition

Examining a group of accident reports, there is a monotonous repetition:

- A soldier reaches for a fallen crowbar and catches his finger between the moving turret and the hull wall.
- A hatch cover vibrates loose, striking a soldier on the hand (or head, etc.)
- An ammo round slips from the rack, injuring a soldier's hand.
- A gun is elevated, crushing the gunner's hand.
- A tank hits a ditch and the TC's head strikes the turret, causing a concussion.

• A tank hits a bump, knocking the soldier in the gunner's station unconscious.

• A hatch is not secured, and hits a soldier's head (or hand, or finger, etc.)

• A tank hits a depression, throwing a soldier against an inside wall and fracturing his pelvis.

Head and neck injuries are the most prevalent in tracked vehicles, according to accident reports. About 36 per cent of all injuries reported in FY 84 were head and neck injuries, a majority of these suffered by drivers or passengers in *M113s* or other carriers. Wearing the CVC helmet or a steel pot would greatly reduce head and neck injuries.

Injuries to other parts of the body — the trunk, arms, and legs — were distributed about equally among the rest of the accidents reported. Most trunk injuries occurred in the carriers while leg injuries were about equally prevalent in the *M60* tank and the carriers. The victims of most trunk, arm, and leg injuries were passengers.

The statistics show a soldier's chance of being injured depended upon his job or what he was doing at the time. Being a passenger seems to be more risky: the passengers in tracked vehicles received the majority of the injuries. Second in frequency of injury were drivers, then supervisors.

More injuries occurred in the *113s* and other carriers than in other tracked vehicles, about 53 per cent. But carriers, of course, have a great deal of exposure and carry passengers. Injuries in the *M60* were the second most frequent, accounting for 18 percent of the total.

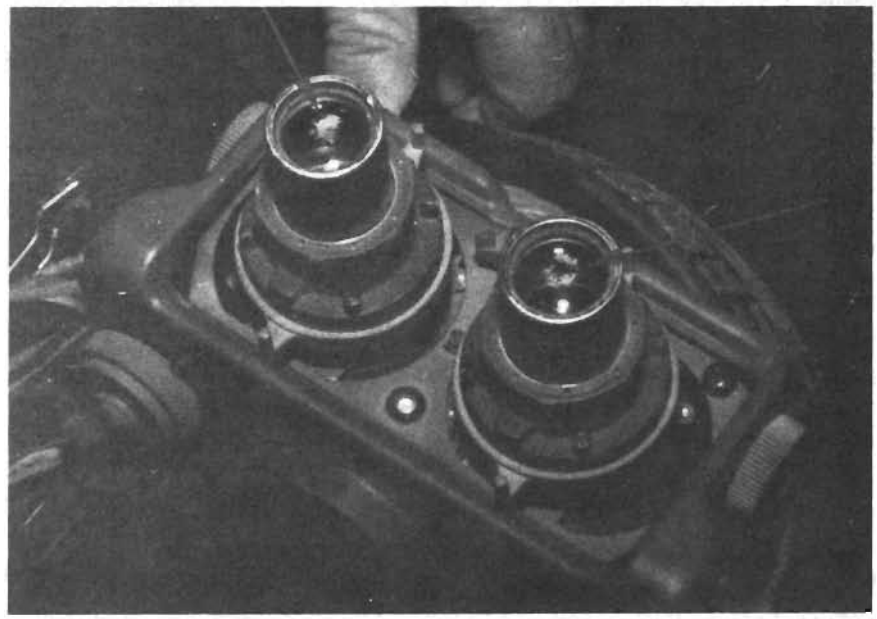
Emphasizing Safety

Soldiers can do a lot to protect themselves and reduce the number of vehicle injuries.

• **Communicate.** Every crew member should know what is being done and when. He should be in his proper location inside the vehicle before it moves. Passengers should be well briefed and vehicle commanders need to ensure that passengers know and observe all safety precautions.

• **Use restraint systems.** When restraint systems are installed, they should be used. These systems will keep crew and passengers from being thrown around inside the vehicle when traversing rough terrain. Being securely belted in is a routine precaution that many soldiers seem to ignore.

• **Secure hatches.** Make sure all hatches are securely in place. Hatches that close unexpectedly continue to cause injuries. Although a technical bulletin (TB 43-0001-39) was issued in April, 1979, requiring installation of a positive safety latch on all *M113*-series vehicles, these latches have not been



Scratched lenses on this night-vision device, incorrect operating procedures, improper focusing, and inadequate natural illumination led to the death of an *M113* driver in a collision with *M60* tank.

An Accident Report:
M113 Collides With M60, Kills Driver

The convoy commander was in the lead *M113A2* as the unit moved in a night tactical road march to occupy an assembly area. Vehicles were using blackout drive, and at the time of the road march, there was no natural illumination.

The convoy commander had halted the convoy when his driver ran off the tank trail because the driver couldn't see.

The driver of the lead *M113* was wearing his night vision goggles (NVG) attached to his combat vehicle crewman (CVC) helmet. The observer was wearing a steel helmet and no NVG; the TC was wearing a CVC without NVG; and the convoy commander was wearing a CVC with NVG not attached — he was using the NVG intermittently.

At about 8:15 p.m., the convoy commander halted the column to check a landmark and confirm his location. He thought he had passed the crossing trail so he directed his *M113* driver to turn around and go back down the column. The column was directed to hold in place.

The accident vehicle was traveling in the opposite direction of the column. The third vehicle in the column, an *M60*, was stopped and had the main gun tube forward and to the left of the tank's front fender with the muzzle end of the gun elevated about 6-½ feet above the ground. The *M60* tank driver told his TC that the *M113* was on a collision course with them and was going to run into the tank's main gun tube.

The *M60* TC tried to move the turret with the TC's override; however, because of a maintenance deficiency, the *M60's* turret power was off. The TC tried to turn the turret power on, but the *M113* had collided with the main gun tube.

As the *M113* attempted to pass the *M60*, the observer in the *M113* cargo hatch and the TC both yelled, "Watch out for the gun tube!" The muzzle end of the main gun tube hit the *M113* driver's center vision block, then struck the driver in the jaw and along the left side of his face and neck. The tank's gun tube passed across the top of the *M113* and struck the TC in his abdominal area, pinning him in the TC hatch.

The driver of the APC sustained fatal injuries. The TC sustained major injuries to his abdominal area.

installed on all vehicles, they are not always being used on vehicles that have them,and in some cases, the latches are broken and have not been repaired. Secure hatches would prevent many injuries.

- **Reduce speed.** Drivers could save a lot of teeth and broken noses by reducing their speed. Speed can make hitting bumps and depressions dangerous. Use the TC as another set of eyes to help spot hazards.
- **Think safety.** Unguarded areas such as the turret and breech block snatch the unwary. A little thought can keep hands and feet out of these areas and free from injury during sudden movement.
- **Follow a load plan.** Securing objects inside the vehicle can keep a soldier from being hit by a flying object.

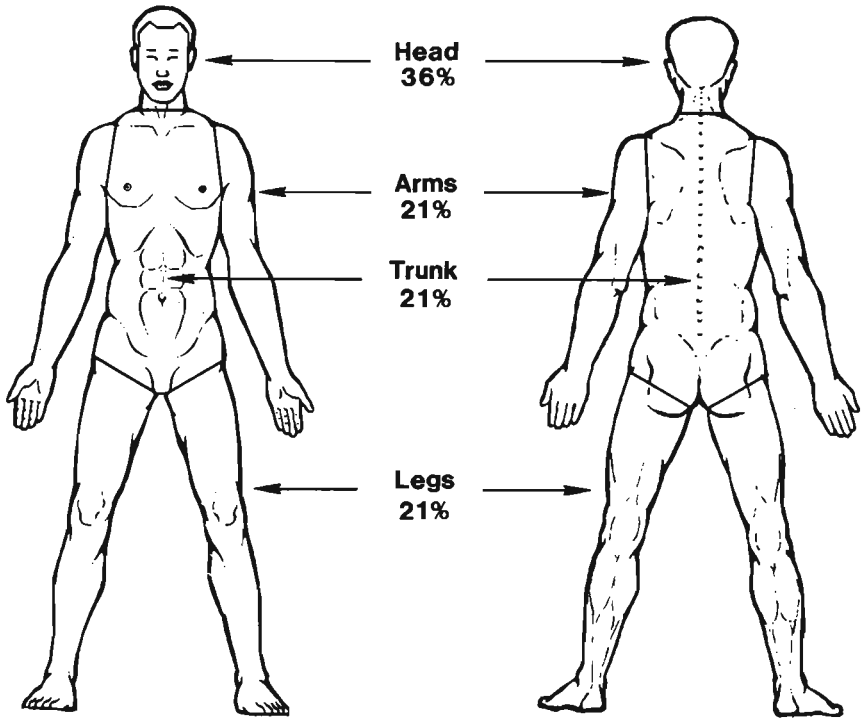


Chart illustrates the distribution of injuries suffered by soldiers involved in combat vehicle accidents in FY 84.

An Accident Report:

Mechanic Pinned When M88 Transmission Malfunctions

The salvage 5-ton dump truck had six wheels to be removed and was parked at the installation's cannibalization point. The driver and mechanic assigned to remove the wheels obtained a dispatch for the unit's *M88A1* medium recovery vehicle to do the job.

When the soldiers arrived at the cannibalization point with the *M88A1*, the mechanic dismounted and ground-guided the *M88A1* to the 5-ton truck. After stopping the *M88A1*, the soldiers prepared it for lifting. When the driver raised the boom, the mechanic climbed onto the bumper of the 5-ton dump truck to grab hold of the snatch block to keep it from swinging and to apply pressure on it to ensure the cables did not tangle while the block was being lowered. The driver saw the *M88A1* was parked too close to the truck to make a proper lift. He told the mechanic, who was standing on the bumper of the truck, that he was going to move the *M88A1* back a few feet.

The driver looked down at the shifting lever, placed the lever in reverse, and the vehicle pitched forward. He looked up and saw the mechanic pinned between the front blade of the *M88A1* and the front bumper of the truck. The vehicles were joined and the *M88* was still moving forward. The driver stopped the vehicle's forward movement by jerking the shift lever back to first gear, then slamming the shift lever into reverse.

A ground guide attempting to position this M88 recovery vehicle in a salvage oepration was crushed between the M88 blade and the truck at left when the M88 shift lever malfunctioned and the vehicle moved in the wrong direction.

The mechanic was crushed during the accident sequence. His body was attached by his belt to the right front tow pintle of the 5-ton dump truck.

After the vehicle started moving backwards, the driver had to stop it by shutting off the engine using the emergency shutoff switch. The *M88A1* was still in reverse gear. It had traveled 98 feet before halting atop two scrap ¼-ton vehicle bodies.

A soldier sleeping at night in the deep shadow of a tree was crushed by an *M60* tank and another was seriously injured. They had not expected tracked vehicles in the area.

An Accident Report:
Moving at Night, M60 Crushes Two

The *Chaparral* guided missile carrier was in position and the squad was placed on battle station alert. They were maintaining both a command post and an observation post (OP) which was approximately 150 meters from the carrier. Two soldiers were assigned to man the OP. One soldier at the OP was required to remain awake at all times in accordance with the platoon leader's orders and standing operating procedures.

The soldiers decided to rotate the duty hourly. Four times the squad leader physically checked the OP, and during a check at 2400 he issued the new challenge and password. At 0100, the two soldiers were under a tree, one lying down asleep in his sleeping bag and the other on duty, sitting against a tree with his legs in his sleeping bag. Neither soldier expected track movement through their area.

At about 0115, nine *M60A1* tanks began to move in column formation up the tank trail. Part way up the trail, one tank had a partial loss of steering and abnormal instrument gauge readings and pulled off to the right. The company commander, who was in the disabled tank, directed one of the *M60s* off the road and into the trees for concealment. The *M60* tank proceeded to find suitable cover under a tree whose shadow would assist in breaking up the pattern of the tank. The tank was moving at about 3 miles per hour toward the tree.

The soldier in the OP who was on duty was dozing and did not see nor hear the tank coming toward the tree until it was 5 feet from him. The soldier started to scream and tried to move out of the tank's path, but was unsuccessful. The left track of the *M60A1* ran over his lower legs. The tank continued forward and crushed the sleeping soldier.

JUNE GREER is a writer for COUNTERMEASURE, a publication on ground safety produced at the U.S. Army Safety Center, Fort Rucker, AL. With a bachelor's degree in English and journalism from Troy State University, Troy AL., she has previously written for local area newspapers and was a writer-editor at the Army Aeromedical Research Laboratory for 5 years.

A Blackhawk lifts two Fast Attack Vehicles (FAST-V), one armed with a TOW, the other with a Caliber .50 machinegun.

The Pros and Cons of the New Ultralights

by Edwin W. Besch

A new class of combat vehicle is emerging. It is the ultralight, characterized by light weight (1-8 metric tons), innovative design, the latest armament, and the use of unusual materials. Armored and unarmored, tracked and wheeled, these vehicles are especially attractive because they can be strategically airlifted in large numbers and can also be carried by helicopter.

Small, inexpensive combat vehicles have a long history. They include the machinegun-armed tricycle, circa 1900; the Renault light *FT-17,* 2-man tank (6.5 metric tons) used by the French and U.S. forces in WWI; the British tracked *Bren gun carrier* and Soviet *BA-64,* 4x4 armored car of early WWII; the postwar British *Ferret* scout car; and jeeps armed with machineguns, recoilless rifles and antitank guided missiles.

Modern tankers in their 40-to-60-ton machines may regard these lightweight combat vehicles as merely interesting oddities from the past, and the new ultralights as not much more potent. But the modern ultralights have a very low battlefield signature, along with the capability of carrying a half-dozen or so tank-killing guided missiles. They can also mount short-range surface-to-air missiles (SAM) or 20-to-30-mm automatic cannon capable of engaging light armored vehicles.

The capabilities of the new ultralights as weapon carriers, coupled with their concealability and quiet operation, make them especially useful for conducting ambushes, raids, flank attacks, economy of force operations, convoy escort, reconnaissance, and internal security operations, either alone or in conjuction with heavier mechanized forces.

Most ultralight combat vehicle designs are derived from military or commercial jeeps or trucks, including recreational "dune buggies", and use commercial automotive and suspension components to save development, production and logistics costs. The list of newer ultralight combat vehicles — 8-metric tons or less — available in the West is impressive. Some have been designed to meet specific domestic military requirements while others are private ventures intended only for export. Tracked models include: Belgian *ACEC* (6.5-t)[1]; French Lohr *VPX-90* and *110* and newer *VPX-600* (4.6 to 5.5t); and German *Wiesel (Weasel)* airborne/airmobile 2.9-t *TOW* missile or 20-mm gun carrier, of which 310 are on order for German airborne brigades.

Foreign wheeled (all 4x4) ultralights include: Brazilian *EE-3 Jararaca* (5.5-t); French Lohr *RPX-6000* (5.4 to 7.0-t); Panhard *Ultrav-M11* and Renault *VBL;* German Kontac *Desert Fox* (3.5-t); Israeli *RBY* (3.6-t) and *Ram VI, V2* (5.4 to 6.0-t); Italian Ferrari *Lizard F333E* (2.6-t) and OTO-Melara *R3* (2.7-t); Spanish *BMU-2;* Swiss MOWAG *Piranha* 4x4 version (7.8-t) and *Spy* (7.5-t); and United Kingdom's Alvis *Fox* and *Ferret 80.* France also produces a 6x6, the *ERC 90* (7.65-t).

The U.S. has developed nearly as

"Small, inexpensive combat vehicles have a long history"

many ultralights as France (the only other Western country that has a large rapid deployment force). U.S. vehicles include: Cadillac Gage *Commando Ranger*/U.S. Air Force *Peacemaker* (8 men, 4.5-t), the *Commando Scout* (2-3 men, 6.6-t); combat versions of AM General's *M998*-series *Hummer* 1 1/2-t high mobility multipurpose wheeled vehicle (HMMWV); Emerson Electric's 2-man, 1-t Fast Attack Vehicle (FAST-V), and the Nordac *NMC-40 Warrior* 3-man *FAST-V*. All of the U.S. ultralights are 4x4; the *FAST-Vs* are virtually a new class by themselves.

The above list does not include transport vehicles simply mounting weapons or, like British Land Rover jeeps, fitted with armor kits. Most of the ultralights are limited to weapon carrier roles, since they carry only 2-4 men; some, like the Belgian *ACEC*, Swiss *Piranha* 4x4, and *Commando Ranger*, however, can carry 8-10 men, including crew. All of the vehicles listed, except for AM General's *Hummer* and the two *FAST-Vs*, are armored to protect against small arms fire at varying distances, light artillery fragments, and antipersonnel mines. This protection level is about equivalent to that of many heavier *LAVs* weighing up to 20-t and is necessary to ensure mission accomplishment; survival of crew and vehicle; and an aggressive, confident crew who need not fear the first burst of small arms fire that strikes their vehicle. The *Hummer* and *FAST-V* can be fitted with Kevlar that provides protection against 17-or 44-grain artillery fragments.

Two Warsaw Pact (WP) countries developed several early ultralight combat vehicles. The Soviet *BRDM-2*, 7-t, 4x4 reconnaissance scout vehicle and *BMD-1*, tracked, airborne infantry fighting vehicle/(IFV) fielded in 1966 and 1970, respectively, are lightweight, offer impressive fighting capabilities, and have been produced in large numbers. The widely exported *BRDM-2* carries a 4-man crew, is armed with turret-mounted KPVT 14.5-mm and PKT 7.62-mm coaxial machineguns, and is fitted with auxiliary belly wheels as mobility aids. Tank destroyer and air defense versions of *BRDM-2* mount 4 to 6 launcher rails for various antitank missiles or the *SA-9* Gaskin SAM. Hungarian *FUG/OT-65* and *FUG D-944* are similar to the *BRDM-2* in design.

The High-Mobility Multipurpose Wheeled Vehicle (HMMWV), seen above with a TOW system mounted, has a big role in the new light infantry divisions. Other U.S. projects include the FAST-V, at right, and the LAV-25, below, the Marines' Light Armored Vehicle (LAV), which is much heavier (14.1 tons) than an ultralight, but easily transportable by air.

"...Mechanized airborne units are more survivable ..."

After 14 years, the *BMD-1* is still the world's only airborne IFV. It is armed with an antitank missile and 73-mm gun combination as main armament and carries a 3-man crew and 4-5 airborne infantrymen, who can fight mounted under armor and CBR protection or dismounted, supported by their IFV. The air-droppable *BMD-1* and its variants equip seven Soviet mechanized airborne divisions and numerous air assault brigades and have seen combat in Afghanistan, Mechanized airborne units are more survivable and have significantly greater firepower and effective striking radius than foot-mobile airborne/airmobile infantry after being landed. These likely adversaries for Western ultralight combat vehicles already have set high combat standards, but they probably will soon be replaced by improved models.

Fighting Capabilities

The new Western ultralight combat vehicles can also mount formidable main armament: *HOT, MILAN,* or *TOW* antitank guided missile launchers; light or heavy machineguns, including the Mk 19 40-mm grenade launcher; or a 20-to 30-mm automatic cannon. AM General developed the lightweight, fully-stabilized Remote Electric Drive Turret *(RED-T)* that can mount various weapon types, including the Hughes *M242* 25-mm Chain gun used on the *M2 Bradley* IFV and the U.S. Marines' *Piranha LAV-25,* a Setter weapons/sensor suite, or *Stinger* SAMs for combat versions of the *Hummer.* But the *RED-T* can be fitted to many other vehicles as well. Combinations of ultralight combat vehicles armed with antitank and surface-to-air missiles and 20-to 30-mm automatic cannon could successfully engage tanks, IFVs, foot-infantry, helicopters, and low-flying aircraft under favorable tactical conditions when their limitations, such as inadequate armor protection, are minimized. Mounting only a light machinegun that provides no more firepower than that carried by a foot-soldier as main armament on a $100,000-plus vehicle, however, is wasting capability, unless the vehicle is used by civilian police.

Design Philosophies

Four of the newest ultralight combat vehicles are worth discussing in more detail because of their different design derivations, protection levels, and capabilities. Two vehicles, the *Hummer* and *FAST-V,* are being procured for use in U.S. Army motorized and/or light infantry divisions; the Panhard *Ultrav-M11* and Renault *VBL* are competitors for French Army reconnaissance scout and antitank vehicle roles and for export (40-45 *M11s* have been ordered by Mexico).

Combat versions of AM General's *Hummer* are adaptations of its *M998* series 1 1/2-t, 4x4 vehicles of which 55,000 are being procured in various versions by the U.S. Army and Marine Corps. The *TOW* and 25-mm Chain gun versions will be used in the 9th Motorized Infantry Division and by a ground reconnaissance troop in each of the new Army light infantry divisions. Marines will use the *Hummer TOW* version but want 44-grain ballistic protection.

U.S. light infantry squads will ride in unarmored *Hummers* armed with a light machinegun or a Mk-19 40-mm

weapon. As an infantry squad carrier, with or without Kevlar ballistic protection, the *Hummer* does not provide a mounted fighting capability. And it compares unfavorably in platoon firepower, armor and CBR protection levels, capacity, cross-country mobility, and swimming capability both with Soviet *BTR-60/70* 8x8 *LAVs* widely used by WP and many Third World light mechanized infantry units and the 9-man *Piranha LAV-25* used by an *LAV* battalion in each U.S. Marine division. Although USAF *C-130, C-141B* and *C-5A* transport aircraft can each carry three times as many *Hummers* as they can *LAV-25s,* it would require nine or 10 *Hummers* (and 10 to 12 extra drivers

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anha 4 x 4, above, and the Marines LAV-25, an
t right, bear a strong family resemblance. They
veloped from the same basic chassis.

iet BMD, below, is still the world's only airborne
fighting vehicle. It has been in service for 15
he BRDM-2, lower left, is a wheeled reconnais-
cout vehicle first fielded in 1966. It is armed with
eguns, but air-defense and antitank missile sys-
e mounted on some models. Both have been
d in large numbers.

and gunners) to carry a reinforced motorized infantry platoon that matches the firepower of a light mechanized infantry platoon equipped with three *Piranha LAV-25* fitted with dual *TOW-2* launchers. Thus, the strategic airlift advantages of ultralight combat vehicles compared to heavier *LAVs* may be overrated, especially when overall capability and survivability also are considered.

AM General's *Hummer* was chosen from three HMMWV candidates in 1983. Using components common to its utility truck versions should make the *Hummer* combat version relatively inexpensive to produce and maintain. All *Hummers* are powered by a Detroit Diesel 6.2-liter, 4-stroke cycle, V-8 engine coupled to a 3-speed Hydramatic THM-400 transmission. The 2.3-t (empty) to 3.87-t *Hummer* can accelerate to 80 km/h in 20 seconds and top 113 km/h on roads. It has a 563-km range, can climb a 60-percent grade or a .56-m vertical step and fords 1.52 m with a fording kit. It can be airdropped by the low altitude parachute extraction system (LAPES) or carried slingloaded by *UH-60A Blackhawk* or, two at a time, by *CH-47* and *CH-53* helicopters.

Emerson's *FAST-V* is an even more unconventional design than the *Hummer* and is strictly limited to weapon carrier roles. The *FAST-V's* tubular frame with roll cage is only 3.6m long and 1.44mm high (without armament). It can be powered by either a 94-hp gasoline or a 90 to 100-hp diesel engine coupled to either a 4-or 5-speed manual or 3-speed automatic transmission. The *FAST-V* can accelerate to 100 km/h in less than 12 seconds and can top 116 km/h. It can climb a 0.3 m vertical step or a 60-percent slope and has a range of 500 km. It can incorporate Kevlar ballistic protection against 17-or 44-grain fragments. Empty weight is 0.68 to 0.9 tonnes; armament can be a *TOW* launcher and optional *M60* 7.62-mm machinegun, a caliber .50 machinegun, or a Mk 19 40-mm grenade launcher. Two *FAST-Vs* can be carried by a *UH-60A*, seven by *CH-47* helicopter, or six in a *C-130* airplane. The U.S. Army plans to procure 583 *FAST-Vs* to equip two light attack battalions in the 9th Motorized Infantry Division and other light forces. Each light attack platoon will have four *FAST-Vs* armed with a Mk 19 40-mm grenade launcher and three *FAST-Vs* armed with a *TOW* launcher.

Panhard's *Ultrav-M11* 4x4 is essentially an armored "jeep" in configuration, but it offers good armor protection and a swimming capability. It weighs up to 3.55-t, combat-loaded,

and carries a 3-man crew. It can be armed with a *MILAN* or *TOW* launcher (with 6 missiles) or a 12.7-mm or 7.62-mm machinegun. It is slightly larger than the *FST-V* but smaller than the *Hummer*. It is powered by a Peugeot XD3T 4-cylinder, liquid-cooled, turbocharged 105-hp diesel coupled to a German ZF 3-speed automatic transmission. It has independent coil-spring suspension in front and torsion bars in the rear. It has a maximum speed of 95 km/h on roads and 4 km/h in water. It can climb a 50-percent slope and has a range of 750-1,000 km with extra fuel. The *M11*'s high-hardness armor steel plate (5-11.5-mm thick) protects against 7.62-mm AP ammunition frontally and 7.62-mm ball ammunition on the sides. The *M11* can be fitted with CBR collective protection and/or air conditioning systems. A propeller kit for amphibious operation is optional.

The *M11*'s 3.4-3.75 cu. m interior is accessible by side and rear doors and three roof hatches. It uses Michelin 900 x 16 "run-flat" tires. Panhard also envisions using the *M11* as a command and control vehicle, ground surveillance radar carrier, or air defense vehicle fitted with *Stinger* SAMs. (See "Panhard's New Light Armored Vehicle," Jan-Feb 85 *ARMOR* Magazine. Ed.)

The Renault *VBL* is of less conventional design than the *M11* in that its militarized commercial engine is mounted in the rear. It has lighter (4 to 6-mm thick) armor, but weighs less (2.55-t empty, 2.97-t loaded) than the *M11*. The French Army established requirements (in 1977) for an under-3.3-t Vehicule Blinde Leger (VBL) —Light Armored Vehicle — to replace scout jeeps and to use as an antitank missile carrier. About one-third of the 8,000 armored vehicles that will be procured to equip the recently established 5-division French Rapid Action and Assistance Command and to modernize other combat units are expected to be the winning VBL competitor. The French Army also is procuring other, heavier, armored vehicles, including *AMX-10RC* 105-mm gun, 6x6 fire support vehicles and *VAB* 4x4 *APCs* for its light armored, infantry, and marine[2] divisions as well as 900-1,000 new main battle tanks and *AMX-10P* tracked IFVs for its mechanized divisions.

Limitations

Several years ago, a retired European general suggested that flooding the Central European battlefield with thousands of missile-armed, cheap, ultralight vehicles like the early French open-topped, tracked *VPX-90* ought to be sufficient to stop (WP) armored thrusts. In a similar vein, a U.S. Army officer suggested to the author that the scenario from the TV-series "Rat Patrol" is appropriate for visualizing the U.S. 9th Motorized Infantry Division using ultralight combat vehicles on the modern battlefield.

In his euphoria over a new type of weapon system, the European officer conveniently forgot that (WP) tanks are part of combined arms forces and that ultralight combat vehicles and their crews are particularly vulnerable to artillery fragments, multiple rocket launcher barrages, light cannon and, in some cases, small arms fire, even if they are difficult to spot from "buttoned up" tanks. Likewise, the "Rat Patrol" fantasy, in which machinegun-armed jeeps sometimes defeat armored combat vehicles, is far different from WW II reality when British armed jeeps and light Chevrolet trucks conducted surprise raids against German rear area supply dumps, unescorted truck convoys and airfields far from front lines where the few German armor units were concentrated. Today, the proliferation of armored vehicles of many types, attack helicopters, longer range artillery, and modern sophisticated night vision devices, surveillance radars, and remote sensors make it far more difficult to roam unobserved behind enemy lines to find "soft" targets without means of defense, and to escape from enemy air/ground reaction forces.

Military organizations are innately conservative and their leaders are often prone to ignore new types of weapons that they have no experience with. At the other extreme are budget analysts and wargamers, who often oversimplify or ignore difficult-to-quantify complexities of the battlefield, and who may become over-enthusiastic about a new, untried weapon system as an alternative to proven, but more expensive systems.

User Questions

If armies are to use ultralight combat

The West German Wiesel (Weasel), far left, packs a TOW missile or 20-mm autocannon on a 2.9-ton chassis. It will be used by the nation's airborne brigades.

At left, Marines demonstrate the swimmability of their LAV-25.

British Fox, at right, mounts a powerful Rarden 30-mm cannon on its ultralight chassis.

vehicles effectively, they must find a middle ground between exaggeration of their capabilities and total neglect because they may seem unconventional compared to heavier combat vehicles.

Three pertinent questions need to be asked before procuring ultralight combat vehicles: (1) What functions/missions can they *best* perform? (2) What protection level should they provide? (3) What type/size unit can best exploit their potential?

As to the first question, ultralights with light armament can scout in conjunction with heavier-armed recon-fire support vehicles; patrol against guerrillas, smugglers, etc. as military/civilian police vehicles; replace unprotected jeeps and motorcycles for liaison roles in combat units; perform engineer reconnaissance, and serve as training vehicles. Combinations of antitank missile and cannon-armed ultralight combat vehicles, supplemented by ultralights mounting short-range SAMs for protection against helicopters, would make a potent combat force for raids, ambushes, combat outposts and flank and rear-area security missions to counter enemy airborne assaults, raids, guerrillas, etc. Their capabilities to be carried sling-loaded by medium helicopters or internally in heavy cargo helicopters, and to be air-dropped would make them especially suitable for airborne/airmobile operations behind enemy lines or reinforcing surrounded friendly forces.

Second, to perform these missions, ultralight combat vehicles and their crews must rely on stealth to achieve unobserved approach, surprise, and safe withdrawal. To accomplish their missions with at least a reasonable chance of surviving to fight another day, ultralight combat vehicles ought to incorporate enough armor to protect against the most common but least powerful military weapons; small arms and light machineguns beyond point-blank range, and antipersonnel mines. Protection against hand-held antitank weapons is not possible today in under 40-tonne armored vehicles, and even that is only in front. In regards to protection, French Army *VBL* requirements are more realistic than U.S. Army protection requirements for the *Hummer* and *FAST-V,* which are supposed to enable U.S. motorized and light infantry divisions to fight Soviet-style armored, mechanized infantry, and mechanized airborne divisions effectively.

Using Units

Lastly, the types and sizes of using units are important factors in deciding what type(s) of combat vehicles should be procured. Ultralight combat vehicles can neither mount medium or large-caliber machineguns or 75-to 120-mm cannon and substitute for tanks, nor can they carry an 8-to 10-man infantry squad/crew *and* mount the necessary 20-to 30-mm automatic cannon as main armament. And even most 10-to 15-t armored vehicles do not carry infantry squad, automatic gun, *and* antitank missiles (although a 4-to 5-man platoon commander's *LAV-25* could be so modified and carry up to 12 missiles).

Thus, ultralight combat vehicles *cannot* substitute for main tanks, heavy fire support vehicles, or tracked IFVs; and they *should not* be used to substitute for adequately-armed, wheeled infantry squad carriers that provide adequate room for a 2-man crew and six or seven soldiers who can fight dismounted; armor and CBR collective protection; a swimming capability; and, if fitted with firing ports, a mounted fighting capability for the infantry squad.

All modern Soviet infantry squad carriers: *BMP-1* and *-2, BTR-60PM/70,* 8x8, and *BMD-1* provide these capabilities. The *BMP-1* is used by 20 other armies, and the *BTR-60PB* also has been widely exported to Third World countries.

American misuse of capable, specialized units dates back to 1776, when American riflemen, who could not reload quickly and had no bayonets for their long rifles, were virtually annihilated by British and Hessian line infantry, who reportedly even pinned some Americans to trees with their bayonets. At Saratoga, only a year later, however, American riflemen distributed in small squads acted in concert with Continental line infantry, who supported the riflemen when they fell back, to achieve a concerted, decisive victory over the British. Technically, they are far different, but like those rifleman, ultralight combat vehicles possess distinct capabilities that should be maximized, and limitations that must be minimized in

Versions of the Commando armored car were used in Vietnam, mainly for convoy escort.

order to ensure success and reduce combat losses.

Because of their inadequate protection and their inability to carry both modern main armament and an infantry squad of reasonable size, ultralight combat vehicles should not substitute for 10-to 15-t *LAVs* in the squad carrier role in "line" infantry units that perform a variety of offensive and defensive missions. *LAVs,* e.g., French *VAB,* Piranha *LAV-25,* and numerous other, similar, vehicles are better suited by design for this important role. Another disadvantage of using ultralights in line division sub-elements (other than for reconnaissance, liaison, or other support tasks) is that they would too often be used in assault or "stand and fight" situations when their limitations would make them most vulnerable.

Combat capabilities of the ultralights would be maximized if they were assigned to independent, specialized brigades or battalions, such as Rangers, which employ unconventional tactics and which are commanded by officers who would better understand the vehicle's limitations as well as their potentials. Independently organized and trained light attack battalions equipped with *FAST-Vs,* for example, would be much more effective conducting hit-and-run attacks on the enemy's flanks or rear in conjunction with operations by a "line" light mechanized infantry division equipped with *LAV-25* infantry squad carriers and *LAV-90* or *LAV-105* fire support vehicles rather than providing direct support to light motorized infantry fighting dismounted.

Well-armed and adequately-protected ultralight combat vehicles also would be ideal for increasing the firepower, tactical mobility, endurance, and survivability, and extending the effective ground radius of airborne and airmobile infantry after landing. In addition to ultralight weapon carriers, slightly heavier *LAVs,* such as the *Piranha LAV* 6x6 (two of which can be carried in a *C-130),* ought to be considered as airborne squad IFVs to match the Soviet *BMD-1.*

The Soviets have been airdropping *BMD-1s* for a long time, using parachutes equipped with retrorockets to cushion the landing. Instead of relying only on LAPES, which requires the transport aircraft to descend to very low altitude, vastly increasing its vulnerability and limiting the choice of drop zones, isn't it time for the U.S. Army to try the Soviet method?

Ultralight combat vehicles possess considerable combat potential, which can be exploited at relatively low cost in small, specialized units where their unique capabilities and limitations are most likely to be appreciated. If, however, some army miscasts them in the wrong role and/or misuses them in combat for the first time, then they will have to overcome a bad and undeserved reputation before achieving wider acceptance.

Footnotes

[1] Weights shown are for combat-loaded vehicles except where noted.

[2] The 9th Marine Infantry Division is part of the French Army.

EDWIN W. BESCH is a 1960 graduate of the U.S. Naval Academy (Annapolis) and received his master's degree from George Washington University. He served as a Marine infantry officer commanding an *Ontos* antitank battalion on Okinawa and headquarters and rifle companies during ten combat operations in Vietnam, before being retired for wounds. Later, he was a CIA intelligence analyst in Washington and Saigon. He served as a ground forces analyst at the U.S. Army Foreign Science and Technology Center and as a professor of scientific and technical intelligence at Defense Intelligence College, DIA. Later, he became Chief, Asia Branch, U.S. Army Intelligence and Threat Analysis Center. He is the author of more than 40 articles, mostly about light armored vehicles.

Integrating Tactics in Gunnery Training

by Lieutenant Colonel William W. Hansen
and Captain Anthony M. Coroalles

Introduction

The ultimate direction of any unit's gunnery program must be focused toward winning on a future battlefield. To accomplish this end requires the melding of many individual, crew, and unit skills. All these skills, however, revolve around two basic functions: the ability to kill enemy tanks, and the ability to survive. Ideally, gunnery skills (those skills that allow you to kill tanks) and tactical skills (those skills that allow you to survive or put you in a position from which to kill) should be inseparable. In practice, however, gunnery skills have traditionally been given the greater priority and attention over the requisite tactical skills.

The traditional Tank Table VIII (TT VIII), Crew Combat Qualification Course, has as much in common with armor combat as trap shooting does with infantry combat. It is generally a sterile course, run on range roads and fired from predetermined locations. It gives no value to the proper use of terrain, good map reading, or any other tactical skill. Unfortunately, for many units this is the high water mark of their gunnery program. In many units a successful gunnery program is not determined by how well a tank crew performs its kill/survive mission, but rather, on how many tanks *distinguish, qualify* or *bolo*. However, the trend is changing in the armored cavalry community and this article hopefully will add fuel to the fire in improving realism in gunnery training.

During the past two years, 1st Squadron, 10th U.S. Cavalry, 4th Infantry Division, has experimented with a training program designed to break the traditional gunnery training mold. The program was developed around the scout/tank team but can easily be modified for use by a tank section. The underpinning of this program is the inseparability of tactics and gunnery. The inherent trade-off is a much tougher but more realistic qualification course for the scout/tank team.

Pre-gunnery training

A year-round gunnery program is the basic foundation for well-trained crews and units. Yet with limited resources in terms of time, training areas and ammunition, how a unit trains and what it trains on are as important as how often the unit trains. To use a well-worn cliche — we must maximize our training time and resources.

To this end we conducted an analysis of all the individual and crew tasks that relate to tank gunnery. From these tasks we then identified those tasks which we believe are most directly related to gunnery performance, and those tasks that, though important, are only indirectly related to performance. On the most critical tasks, we train intensively all year; the supporting tasks are trained on a moderate basis throughout the year.

The vehicle for the intensive training is a two-phase Tank Crew Gunnery Skills Test (TCGST) (Table 1). The first phase of this TCGST is an evaluation of those individual skills that directly relate to gunnery performance. Each individual in a crew trains to standards on each of these tasks. When each member in a crew receives a satisfactory rating on the individual phase, the crew then proceeds to Phase II, crew skills test (CST). The CST is conducted on a cross-country course using standard NATO targets, and is evaluated by a master gunner. Two devices that have proved of immense value in the conduct of this course are the Thru-Sight-Video system and the Talissi device.

The use of the Thru-Sight-Video system allows the master gunner to critique each run while the crew sits around a television set and observes and hears a playback of their actions during each engagement. The television picture can be frozen and the gunner's sight picture at the time that he gave "On the way" analyzed for proper lay of the gun (cross-hairs). Each fire command and the subsequent crew response can in this manner be analyzed and critiqued.

Table 1.

Tank Crew Gunnery Skills Test

Individual Skills Test

1. Identify ammunition.
2. Load, clear, and immediate action on M240.
3. Load, clear, and immediate action on M85.
4. Give/respond to initial and subsequent fire command.
5. Lay main gun for direction.
6. Range a target with a rangefinder.
7. Estimate range to a target.
8. Load main gun.
9. Prepare a range card.

Crew Skills Test

1. Prepare-to-fire checks to include: boresight/calibrate weapons, place R/F into initial operation, perform computer checks.
2. Occupy a range card position and engage targets from range card information.
3. Engage targets stabilized mode (battlesight).
4. Move from a target-down to hull-down firing position.
5. Engage targets (precision).
6. Engage targets simultaneously.

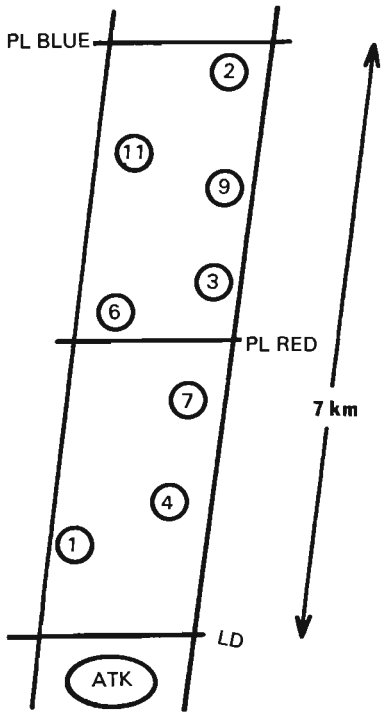


Figure 1

The Talissi device is a laser-based training tool that provides immediate hit/miss feedback to the crew and also provides the mil error on each engagement. A simplified explanation follows: A reflector is mounted in the center of each target silhouette and a number of sensors are mounted around the turret of the firing tank. These feed into a computer/display system inside the turret. When a 'shot' is fired, the laser beam reflects off the target reflector and back to the sensors on the tank turret. The computer analyzes the angle of reflection and provides the hit/miss data to the crew and the evaluator.

"All training needs to be focused

The impact of these two devices is that good, interesting, gunnery training can be conducted year-round without training area or ammunition constraints. Additionally, the scouts are totally integrated in this course since the course is run as a combined tank/scout effort.

Neither the Thru-Sight-Video nor the Talissi device are very good simulators for machinegun engagements. While the Thru-Sight-Video can be used for evaluating a coaxial machinegun engagement, neither training aid is useful in evaluating simultaneous machinegun engagements. Therefore, at regular intervals throughout the year, the squadron also conducts machinegun assault ranges for scouts and tanks. This course is similar to the old TT VI and consists of a variety of simultaneous, moving, and stationary coaxial and *M85* machinegun engagements. Again, each crew is evaluated by a master gunner to strict performance measures and if necessary the course is re-run until completed in a satisfactory manner.

The combination of individual skills testing (IST), CST and regular machinegun assault courses has enabled the squadron to move from calibration to TT VIII qualification without firing the intermittent tables. This conserves ammunition and allows the squadron to conduct additional TT IXs throughout the year. Comparing qualification rates when the squadron fired TTs VI & VII prior to VIII, and the current program are very favorable toward the current system.

Table 2.

Engagement 1. Move from a turret-down to a hull-down position. One moving *T-72* tank (NATO No. 58), 900-1,100 meters, and one stationary *T-72* tank (NATO No. 70), 900-1,300 meters using battlesight engagement from a stationary tank.

Engagement 2. Two stationary tanks (NATO No. 58s), 900-1,200 meters from a moving tank (stab mode).

Engagement 3. Two stationary/*T-72* tanks (NATO No. 70s), 1,400-1,600 meters under precision engagement from a stationary tank (NBC environment).

Engagement 4. Move from a turret-down to a hull-down position. One stationary *T-72* tank (NATO No. 70), 1,400-1,600 meters using precision gunnery from a stationary tank (3-man crew).

Engagement 5. One stationary *BMP* (NATO No. 59), 400-900 meters using battlesight engagement. One *RPG* team, 100-300 meters using TC's sight from a moving tank (stab mode).

Engagement 6. Two sets of troop targets, 400-600 meters using area engagement techniques from a moving tank (stab mode).

Engagement 7. Move from a turret-down to a hull-down position. Two stationary *BMPs* (NATO No. 59s), 1,400-1,600 meters, using precision engagement from a stationary tank (NBC environment).

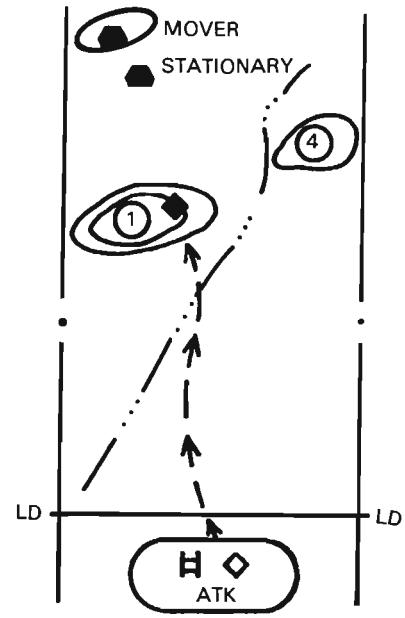


Figure 2, Example 1

The Qualification Course

As was pointed out earlier, all training needs to be focused toward winning on a future battlefield. Qualification courses that are run on range roads with engagements fired from clearly marked positions, at blatantly obvious target locations, fail to meet the criteria of combat realism. These courses develop bad crew habits and foster an atmosphere of gamesmanship among all concerned.

A contributing factor is the unwillingness of commanders to make qualification more realistic and subsequently harder to achieve. In command climates where career success or failure rides on the performance of crews during gunnery, this reluctance is understandable. No commander is going to put his neck on the line and make a qualification course tougher if he is going to be penalized when his results are lower than his peers running a standard course.

In the 4ID no statistics were kept on tank gunnery and although each TT VIII is approved by the division G3, there exists the necessary latitude to innovate. A description of the cavalry scout/tank qualification course follows:

The qualification course began with a night tactical upload of ammunition in troop assembly areas. The scout/tank teams were then issued a platoon operations order and an overlay (figure 1). The operations order directed the scout/tank teams to conduct a movement to contact in sector as part of a

toward winning on a future battlefield..."

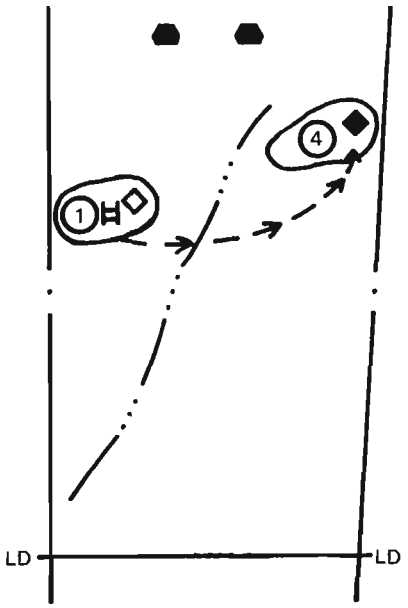


Figure 3, Example 2

platoon. From the LD to PL Blue, the length of the course was approximately 7 kilometers. The next morning, each tank boresighted, and with its scout moved to the attack position. The range OIC, acting as platoon leader, then gave the order to cross the LD and move to the first checkpoint. A detailed look at some of the engagements will follow.

When told to move, the scout and the tank team had to look to their map, locate the checkpoint they were being directed toward, and using the terrain to their best advantage, move to that location.

The course engagements were based on the new *M1* tables. However, the times were modified to suit the characteristics of the *M60A1* RISE/Passive tank. The engagements are shown on Table 2 and a modified *M1* scoring matrix is shown on Table 3. The maximum points possible for each engagement was 100. To qualify, a tank had to achieve a score of 700 points or better on the combined day/night phases.

Example 1, figure 2. The OIC calls TM A on the radio and tells him to move to CP. The scout, using the low ground by the stream bed, moves out to CP 1 as the tank overwatches from the attack position. The scouts dismount at the foot of the high ground on CP 1 and reconnoiter the crest of the hill. The scouts then guide the track to a good hull-down position on the checkpoint.

At this time the OIC presents a moving and a stationary target to the scouts on CP 1. The scouts call the tank, report the enemy targets to their front, and recommend the tank move to a firing position on their left. The tank, using the terrain, moves into a turret-down position on CP 1, identifies the targets and engages them.

The tank crew evaluator, riding on the firing tank, starts timing the engagement when the tank uncovers itself. The time stops when the tank moves back into a turret-down position. Using the scoring matrix (Table 3), if the opening time for the engagement was 6 seconds (target hit on 1st tank), and the closing time was 16 seconds (target hit on the moving tank), the tank would have received 85 points for this engagement.

Example 2, figure 3. TM A is now at CP 1. The OIC calls and tells the TM to move to CP 4. The scouts move out, using the folds in the ground for cover, dismount, reconnoiter and take up a position on CP 4. Observing that there are no enemy targets in sight, the scouts call the overwatching tank to move up to CP 4. As the tank is moving toward the CP, two targets are brought up on the tank's left flank. Since the tank is moving, this engagement is fired in a stabilized mode. The TCE starts the engagement time when the targets come up and stops the time when the last target is hit. Points are calculated as they were for example 1, but a different table is used.

As the reader can see, this type of course molds the tank/scout team into one effective system. The scouts reconnoiter for targets, call the tanks forward and emplace them. Additionally, they can sense for the tank and suppress any additional targets that come into view. There is also a great amount of benefit in terms of safety habits in training with live ammunition.

Conclusion. Although it is true that courses such as the one described here cannot be conducted everywhere (particularly in Europe) because of terrain and range fan constraints, the attempt must be made to blend tactics with gunnery whenever firing is conducted. Only by doing this will crews have the skills and confidence required to win on future battlefields. The key ingredient, however, is the chain of command. If an atmosphere prevails where TGATS and statics determine the conduct of gunnery training, then tactics will always take a back seat and innovation will remain non-existent.

LIEUTENANT COLONEL WILLIAM W. HANSEN is commander, 1st Squadron, 10th Cavalry, 4th Infantry Division. He was commissioned in infantry from OCS and has served as tank platoon leader and XO. He commanded armored cavalry in Vietnam and Germany and served as squadron XO. He holds a master's degree in international relations and secondary education from the University of Utah. He is a graduate of the Naval Command and Staff College, Newport, RI.

CAPTAIN ANTHONY M. COROALLES is a liaison officer with the Ranger Brigade at Ft. Benning, GA. A graduate of the University of San Francisco, he has served as an infantry platoon leader, scout platoon leader, Ranger company XO and rifle company commander. He served as aide-de-camp to the deputy commander, CACDA, and the CG, 4th Infantry Division. He was S3, 1st Squadron, 10th Cavalry, 4th Infantry Division at the time of this writing.

Mounting the Deep Counterattack

by Major Stephen J. Broussard

A successful armored force attack into the enemy rear places both sides in unique situations. The attacked side has a need to retract; it experiences disruption of its activities in the target area and suffers the psychological impact of having its physical security compromised. For the attacking force, there is a need to accomplish its mission, secure itself, possibly find a way back, and be logistically supported. Depending on the distances and terrain, the attacking force may also be out of communication with its parent unit.

One of the most important decisions that must be made early is to determine the objective of the attacking force. Specifically, the force must know whether its target is a terrain objective or an enemy force. That objective must be definite, but the unit must be flexible enough to react to opportunity or diversity. In order to do either, the attacking force must know where the enemy's combat forces are and what they are doing. It is critical to know whether the enemy is deployed and moving in another direction (ideally toward the main battle area).

In many ways the deep attack will resemble a movement to contact as far as getting to the target area is concerned. Ideally, the attacking force will make its penetration quickly through an existing gap or one specially created for it. As the attacking force nears the area where increased enemy contact is likely, it must take increased measures to protect itself. Some of the force might have to peel off to fight enemy forces if a window between enemy echelons has not been hit or if the enemy is defending along the attack route. If the latter situation exists, the attacker must assume that the enemy knows or suspects the attacking force is coming.

The attacking force must use its available fire support aggressively along the attack route. Likely enemy combat force positions must be fired on as the attacking force nears them. Areas that create good kill zones must be well obscured with smoke while the force crosses them, especially if the deployment point has not been crossed. Engineers must be available to assist in clearing hastily erected obstacles. As part of his engineer complement, the commander must make an early decision whether or not he wants to take AVLBs with him. If he does, the force will be slowed down when speed is essential. If he does not and they are needed, he may not reach his objective.

The commander of deep attacking forces must be willing to accept a lessening of effective communications as he goes deeper and he may lose communication totally with his parent unit. This situation will exist and manifests the need for a definite objective and mission before launching the attack and for a simple plan understood by all leaders in the attacking force.

In summary, these are the key tactical considerations for deep attack:

Target determination (terrain or enemy); enemy location (offensive or defensive); deployment points (where various battle drills begin); consolidating the force (attack force egress or link-up); logistical support (combat train makeup) and fire support (communications and range)

Example

During the Field Training Exercise *Flinker Igel,* September 1984, Task Force 3-35 Armor had the mission to counterattack into the enemy rear. It exercised its mission twice, the first attack was very successful. The second was not because the unit never achieved a satisfactory penetration into the enemy flank.

The first attack was performed by a balanced task force of two tank companies and two mechanized infantry companies. There was no cross-attachment below that level. The plan called for a rapid advance through a gap created along the main battle area to an objective 25-30 kilometers away. The attacking force had to travel south approximately 15 kilometers to an intermediate objective before turning east to the main objective. Portions of the attacking force reached the western edge of that objective when controllers caused the action to stop.

The plan called for two mechanized companies to lead; each was followed by a tank company. The scouts screened the task force flank. This formation was to be held until a phase line just before the intermediate objective. The force was to go over that objective with the two mechanized companies and a tank company on line. The other tank company had an on-order mission to occupy blocking positions between the objectives and the MBA. Note that we did not plan to assault the objective, merely to go over it deployed. The force was to search for enemy activity — hopefully command and control elements — not retain that piece of ground.

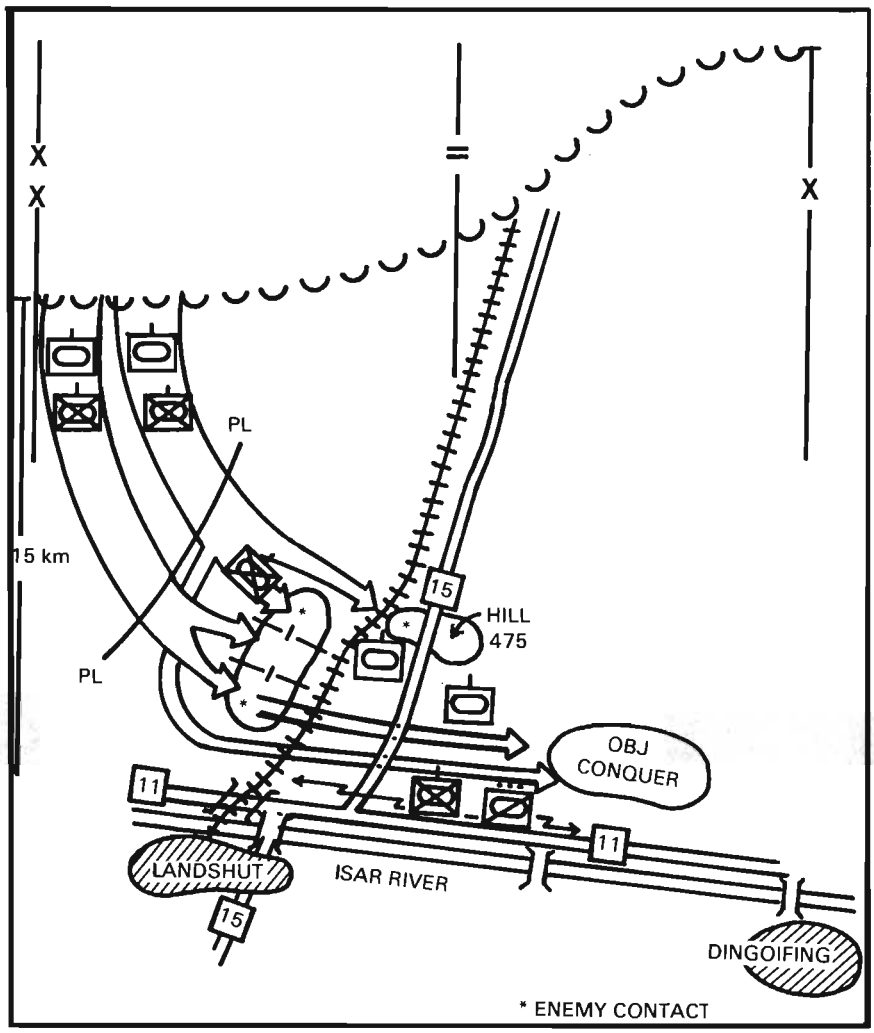
Both of the mechanized companies made contact with the enemy on the intermediate objective. They found the enemy in prepared positions. The tank companies were instructed to bypass on either side of the mechanized companies. One mechanized company accepted some losses but was able to break contact and also bypass with the tank company that went around the right flank. Initially, the deployments were made to eliminate the force on the intermediate objective. However, instructions were received from brigade to continue the attack toward the main objective.

The scout platoon had the mission to screen the right flank; they were in position. The tank company bypassing to the left ran into the rear of the enemy

"The attacking force will make its penetration quickly..."

main battle force just on the northern edge of the intermediate objective. That happened to be one of the tank company's on-order blocking positions. Both it and one mechanized company had to accept combat. The two companies bypassing to the right made it unopposed to the main objective before controllers stopped the attack.

One important aspect of this deep attack that was not played realistically was the role of artillery. This role was reinforced, by its omission, to all attacking commanders. Although artillery was planned for and played, the control system was sluggish in getting artillery results to the scene of the battle. As a result, the enemy force on the intermediate objective was not affected by the attackers' indirect fire and smoke missions. Had it been, the second mechanized company would not have been so strongly engaged initially, as its opposition was largely dismounted infantry in the woods.



Lessons Learned

The attacking force must have a simple plan aggressively carried out, know the enemy situations, orient on either the enemy force or an objective, and pre-plan its movement techniques throughout the counterattack. It should plan to use artillery and smoke as the force moves, and it should begin the attack with full fuel tanks and know how the force will be recovered.

Observations

The deep attack does not have to be very deep before the attacking TF could be out of communications with its brigade headquarters. Communications between the TF and brigade headquarters is absolutely essential in order for the TF to remain apprised of the enemy disposition and changing situation. Additionally, artillery fire support and TAC air can be lost without FM communications between the attacking TF and brigade. If direct support is brought along with the attacking force, the communication difficulties will be minimized. However, protecting the artillery may present other problems to the force commander. The TF and/or brigade retrans is an option; however, that too could be outdistanced and is very difficult to secure on a fluid battlefield. The solution may rest in the aviation community's ability to perform aerial retrans. The system is very effective because the aircraft can remain in friendly held territory and climb to an altitude which electronically "looks" over the terrain without exposing the aircraft to enemy fire.

The tank is not a suitable command and control vehicle for the TF commander. He needs a vehicle which affords him armor protection, a high degree of mobility and maneuverability, and multiple communications capability. The tank affords the TF commander maximum armor protection; however, maneuverability is limited by crossing bridges, narrow streets, railroad crossings, etc. Additionally, the TF commander needs three radios and three nets for channel communications, which the *M60A3* does not possess. To adequately control a TF in the deep attack, the commander needs a *M113* or *M2* equipped with three AN/VRC 46 radios (1 battalion command, 1 FSO).

LIEUTENANT COLONEL CHARLES J. O'BRIEN was commissioned in Armor from Norwich University in 1963. He has held various positions in both regimental and divisional cavalry units in the United States, the Republic of Vietnam and Europe. He recently served as the Battalion Commander, 3/35 Armor in Bamberg, Germany. He is a graduate of the Armor Officer Advanced Course, Command and General Staff College and the National Defense Security Managers Course.

The Deep Attack Helicopter Raid

by Captain Ralph Peters

Today's military planner views the attack helicopter as his predecessor viewed the tank 50 years ago: it is recognized as having great potential, but no one really knows how to use it. It is seen as an add-on to proven formations and it seems to be prohibitively expensive.

Our peacetime training emphasizes the attack helicopter's ill-conceived deficiencies rather than exploiting its capabilities. They are massed for ease of maintenance, training and administration rather than to intensify their combat effect. And, because they are relatively scarce, commanders tend to use them as piecemeal additions to their ground forces.

This practice of piecemeal commitment of our attack helicopter assets is similar to the Allied use of armor in the 1940 campaign in France, where the Germans massed their armor and won with dramatic ease.

Fortunately, a few commanders are seeing the light. They are experimenting with boldness and commit their attack helicopter assets *en masse* to blunt enemy armor penetrations. These same assets, however, have a viable potential as division or corps fire brigades — an antitank reserve capable of swift and devastating reaction. A balance, therefore, must be struck between the two functions, a balance predicated on the tactical situation. In any event, the attack helicopter's aggressive maneuverability must not be overlooked.

The greatest perceived threat to massed, cross-FLOT (forward line of troops) attack helicopter operations is the Soviet abundance of air defense weapons systems. These systems are not infallible. They have shown shocking failures in recent encounters, from the strategic (Korean airliner) to the tactical (recent Middle East) conflicts. They have been successful only against unprepared enemies.

Further, in using these massed air defense weapons systems, the Soviets would be saddled with massive Identification, Friend or Foe (IFF) problems. These problems are currently compounded by personnel rotations and their attendant training problems. Finally, the Soviets would have to create air corridors for their own aircraft and to put their weapons along these corridors on "hold." When such lanes are identified, they become corridors for our attack helicopters.

There remains the threat of air fighting. However, by reason of his training and indoctrination, the Soviet pilot is less likely to turn from his assigned mission to engage targets of opportunity than is his American counterpart. Herein may lie a problem for U.S. commanders; our attack helicopters, launched on a deep strike raid, must not dissipate their force with individual air battles. There is no room for helicopter "aces" in AirLand Battle.

Every military operation entails high risk but we must not allow our perceptions (right or wrong) of the attack helicopter's vulnerabilities to influence our use of this weapons system.

There is a valuable lesson to be learned from the German thinking on armor at the onset of WW II. Had they seen the tank as a mechanically unreliable, expensive, weapon, offering little individual firepower, limited by terrain, difficult to synchronize with the other combat arms and a pure headache to refuel and rearm, they never would have attempted the *blitzkrieg.* But they could see beyond the immediate problems and their use of massed armor was classic.

Today's attack helicopter reflects many of the difficulties and problems of early armor: it is vulnerable to small arms fire, it demands incessant maintenance and its flying and fighting capabilities are limited. It presents a good target in the air and its optimum employment relies on timely intelligence of a standard that neither analysts nor communications can yet provide. Furthermore, it is as useless as it is defenseless when on the ground.

Yet this unlikely collection of nuts and bolts literally alters the dimensions of tactical combat.

Surface-to-surface missiles and fixed-wing attack aircraft serve only to extend the range of ground-based fires. The attack helicopter breaks down earlier restrictions on maneuver. The attack helicopter must not be viewed, or used, primarily as a fire support weapon. It *maneuvers,* and that asset must be exploited.

The attack helicopter is an expensive machine and has its vulnerabilities. The dismounted infantryman, too, is terribly vulnerable and more precious than any machine. Attack helicopter vulnerability is not the critical issue. Effect on the enemy is the critical issue.

Combat rearming and refueling of helicopters are real and pressing problems. The attack helicopter's fuel and ammunition services must be made more mobile and more survivable. Expecting helicopters to rely on trucked resources is as ridiculous as expecting tanks to rely on horses and wagons and five-gallon cans. Fuel and ammunition must be transported in a manner as mobile and protected as the system they support. Attack helicopter formations must be able to penetrate deeply and conduct repeated operations without having to overfly enemy air defenses again and again as they retire to refuel and rearm and repenetrate enemy air. They must take their fuel and ammunition with them — in helicopters anonymous enough not to stand out as critical targets.

Attack helicopter operations can be classed in two areas: (1) massed formations attacking maneuver units, artillery clusters or forward trains and, (2)

"The raid force must be kept mobile. That is its salvation..."

smaller formations on deep penetration raids.

We have accepted these packages and now we must accept that the potential to use ground maneuver elements to complement or to interact with helicopter operations is both logical and desirable. Such thinking may lead to the shifting of priorities. Let us consider the deep helicopter raid.

A fighting commander faces two questions: (1) where can I hurt the enemy most and (2) how can I best use my assets to achieve that hurt? The least effective way is strength-against-strength. The most effective is strength-against-weakness.

The latter poses problems. It is often impossible to detect a weakness at any given time. Even when identified, that weakness is usually too hard to reach. Also, the enemy may have shielded that weakness, and often it is out of range of the systems at hand. Finally, although intelligence may have identified a weakness, it cannot pinpoint it accurately enough to target it. We now have the attack helicopter's maneuverability at hand.

First, however, we must recognize that Soviet air defense systems will be densest at the battle line and, second, his armies are most vulnerable in their depths. The next step is to realize that the attack helicopter is ideally suited for transient basing behind the enemy's committed forces. The Soviet concept of the Operational Maneuver Group already points this way. (See "Tatsinskaya and Soviet OMG Doctrine," Jan-Feb 1985, *ARMOR*. Ed.)

Once an air corridor through the Soviet air defense system has been identified and put to use, speed will translate into heightened security for the attack helicopters. Such a force could consist of eight attack helicopters (two subcommands of four), four helicopters to carry fuel and ammunition (two of each), four helicopters each with an infantry squad to provide perimeter defense during refuel/rearm situations, and two scout helicopters. These eighteen aircraft would be divided into two flights of nine each.

In practice, the attack helicopters strike pre-indentified targets in depth and the scouts select landing zones for the refuel/rearm situations. Even if these strikes are not materially destructive, they immediately present the Soviet commander with an active enemy

force in his rear. His problem is compounded because helicopters, especially and because of their maneuverability, tend to multiply in the reporting chain. In effect, he doesn't know exactly what he does have attacking his rear areas. He must react and his every reaction detracts from his committed forces. He had committed his attack helicopters to programmed missions, and his fixed-wing air assets as well. Withdrawing any or all of these assets from the FLOT denigrates his power at that point. Also, fixed-wing aircraft may not be maneuverable enough to fight helicopters. This leaves him with his maneuver force air defense systems and they, too, have been heavily committed to the FLOT. Should he ignore the attack helicopter strike and continue with his planned battle, he will do so at great risk to himself — and to our final benefit.

The raid force must be kept mobile; that is its salvation — and its effectiveness.

If the deep raid strike is also conducted in conjunction with a ground force counterattack, each increases the other's chances of success. The Soviet Army has many strengths, but, historically, performs best in relatively clear-cut situations and is at its worst when confused.

Upon its return to friendly air, the raiding force must be protected and supported as fully as possible. The best approach would be to identify those enemy air corridors presenting the least threat and then laying on suppressive artillery and/or air strikes.

The fact remains that such a deep strike is a high-risk operation. Although it offers great opportunities for devastating success, it can go all wrong. The battle was never won by the faint-hearted. Virgil, the Greek classicist, wrote centuries ago that "fortune rewards the bold."

CAPTAIN RALPH PETERS had his first contact with the Army in 1975 as a volunteer English language teacher of Vietnamese and Cambodian refugees. Shortly afterward, he enlisted and later was a distinguished graduate of the 7th Army NCO Academy and a winner of the MacArthur Award and the Patton Award for leadership. He is a professional-level German linguist and has served with the 8th ID (M), and 1st Bn, 46th Inf, 2d Bde, 1st AD. He is the author of *Bravo Romeo*.

The first M48 remanufactured under the Turkish program mounts a test slope at the Turkish army's proving ground.

Modernizing Turkey's Tanks

by Major Frederick J. Moll, III

Turkey, with its fleet of more than 3,000 tanks, maintains one of the largest armor forces in NATO. Until recently, this very large fleet was also an old one. Equipped with U.S. Grant Aid Korean War-vintage *M47* and *M48* tanks, Turkish armor forces were no match for the Russian *T-64s* and *T-72s* just across their borders. Equally as worrisome, their fleet was becoming more and more unsupportable, as 30-year-old stocks of repair parts began to dry up.

For Turkey, as well as for NATO, this was an intolerable situation. A quick look at a world map tells us why. Turkey — bordered by Bulgaria, Russia, Syria, Iraq, and Iran — stands alone as an island of stability in a sea of unrest. Its vast open plains and semi-desert areas offer excellent high speed avenues of approach that favor fast, modern armored warfare. Therefore, it wasn't a question of whether or not Turkey needed to upgrade its tank fleet, but of how and when.

Based on lessons learned during the 1967 Seven-Day Arab/Israeli War, Turkish Land Forces Command began to investigate possible ways of modernizing its fleet. However, it wasn't until the 1970s that serious joint discussions were held between the U.S. and Turkey concerning tank modernization. These early discussions centered on the purchase of new tanks from the U.S.. But it soon became apparent that equipping the large Turkish fleet with *M60*-series tanks would be prohibitively expensive. With the advent of the 1973 Arab/Israeli War and the subsequent depletion of available U.S. stocks of *M60*-series tanks, the whole question of new procurement became moot. By late 1974, when the modernization program was still in the "how to" discussion phase, a major setback occurred in the form of the 1975 U.S. Congressional arms embargo. Imposed to protest Turkey's invasion of Cyprus in support of the Turkish Cypriots, the embargo ended virtually all joint U.S./Turkish tank modernization efforts for the next four years. It also suspended much needed logistics support for the Turks' rapidly aging Korean War-vintage tank fleet.

Joint U.S./Turkish military cooperation was renewed when the embargo was finally lifted in 1978 and the tank modernization program was at the top of the list of things to do. The question remained, how to do it. The U.S., having successfully modernized its own *M48* tanks, strongly supported an *M48A5* conversion program for Turkey. This concept also appealed to the Turks. It allowed them to use many existing components, such as hulls and turrets, and to avoid the additional expense of new-item procurement. The conversion would also yield a tank the equal of an *M60*, equipped with a diesel engine and a 105-mm gun at a fraction of the cost of a new tank. Both sides agreed that the *M48* conversion appeared to be the best solution.

Planning proceeded in this direction with the establishment of the Tank Project Management Office under the direct supervision of the Chief of the Turkish Land Forces Command Technical Department (then Colonel, now Brigadier General Sitki Sunday Orun). A U.S. project officer was also designated by the Joint United States Military Mission for Aid to Turkey (JUSMMAT) to assist the Turkish effort and coordinate necessary U.S. support. In the fall of 1979, these officers visited Anniston Army Depot, Alabama, where the U.S. *M48A5* conversions were accomplished. This visit was to determine how much, if any, of the conversion work could be accomplished at existing depots in Turkey,

"The M48 conversion seemed to be the best solution"

the specific work required, the equipment needed and, of course, the costs involved.

This first visit confirmed the feasibility of the project, but it also generated additional concerns by clarifying the magnitude of the program. To put it in perspective, this was to be the largest and costliest single program ever undertaken by the Turkish military. It involved the procurement and in-country production of 25,000 separate parts per tank, the translation of 30,000 technical drawings and a production cost of almost one billion dollars. In terms of technical difficulty, it was like trying to have your local garage convert the 1954 family car into a 1984 model from spare parts. Nevertheless, the program was set in motion with both sides resolved to produce a Turkish *M48A5* by 1983.

By 1980 the planning efforts of the project office began to bear fruit. A U.S. Tank Automotive Command (TACOM) team, headed by Mr. Charles Baldwin of the *M60* Project Manager's Office, completed a survey of the two Turkish depots where the conversions were to be accomplished. This visit determined that with the addition of some heavy industrial equipment, which was available from U.S. surplus defense stocks, production could begin in time to make the 1983 roll-out target. By late 1981, the necessary equipment was identified, and the following year, it was leased to Turkey and on its way to the depot at Kayseri, which was designated as the first of two factories to come on-line.

This initial lease proved to be the first of four leases that provided 53 pieces of heavy machinery valued at $2 million. The cost to Turkey was $186,300. However, receipt and installation of this machinery was only part of the production equation. It permitted the factories to perform the necessary machining and assembly operations, but it did nothing to solve the procurement, production and storage problems of the various components necessary for the conversion. There remained a host of other questions that still had to be answered.

For example, which parts could be produced in Turkey? What technical data would the U.S. make available for in-country production of parts? And, of course, the most important question of all — what would the final cost be?

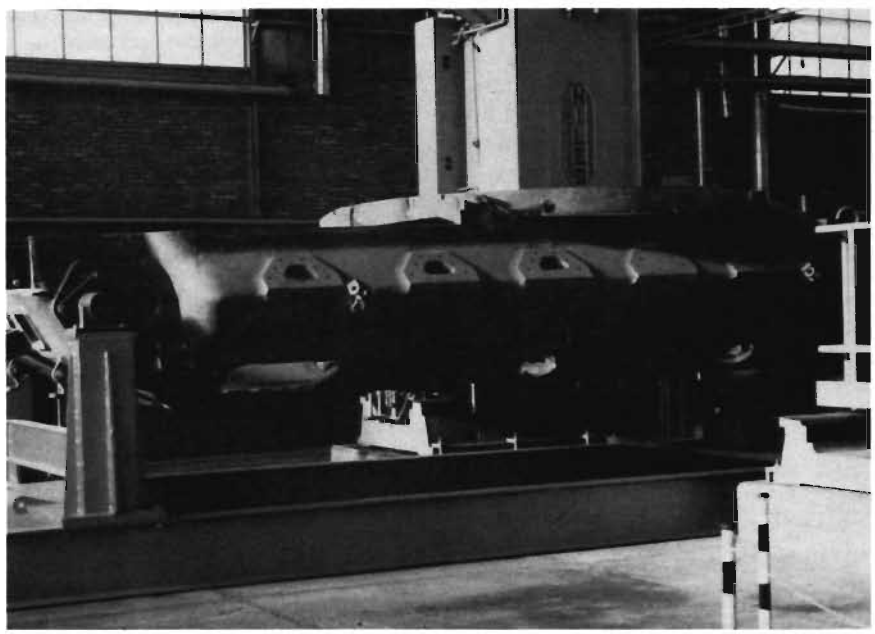
Using Anniston's experience, the 25,000 separate parts needed for conversion were grouped into manageable units of 55 subkits. The 55 subkits represented one complete conversion kit for one tank, with each subkit consisting of related components required to accomplish one facet of the conversion process. These components ranged from the Continental Teledyne 1790-2D engine which became subkit number 30A, to the relatively simple canvas gun shield cover which was designated as subkit number 15. For the first two tanks built in Turkey, all 55 subkits were provided by the U.S., with subkit packaging accomplished at the Anniston Army Depot.

The contract for these first two kits was signed early in 1982 and was followed shortly by contracts for an additional 400 kits, with Turkey manufacturing four of the subkits in-country. This large quantity buy of 400 kits was actually accomplished under three separate Foreign Military Sales (FMS) cases, but was combined into one procurement to take advantage of lower costs in quantity.

However, it was again becoming more and more apparent that the project had grown beyond the limited capabilities of two Turkish officers and one U.S. officer to manage. The logistics efforts alone was staggering. It required the services of at least one full-time ordnance officer to insure that, during the life of the project, all 165,000 subkits (consisting of 75 million parts) were ready at the factories when needed. Also, little substantative planning had been made to support and field the tank once it rolled off the production line.

In retrospect, the formation of a combined/colocated project management office staffed with the appropriate U.S./Turkish expertise should have occurred at the onset of the project. This didn't occur, however, until June 1982. Fortunately, it wasn't too late. Housed in JUSMMAT Headquarters, this office consists of a U.S. Army lieutenant colonel, a Turkish lieutenant colonel, two Turkish majors, one U.S. major and eight Turkish lieutenants; the latter selected for their mechanical and civil engineering academic backgrounds. The formation of this office provided the manpower and talent to accomplish the multitude of tasks that had to be done — frequently simultaneously.

As a combined office, the Tank Project Management Office responds to both the Chief of the Technical Department of the Turkish Land Forces Command (BG Orun) and to the Chief of JUSMMAT (MG Elmer D. Pendleton, Jr.). With this procedure, the project office enjoys the mutual support of a general officer from each country. In



An M48 tank hull stripped and mounted for milling.

"This program has been a model of cooperation..."

the words of the present project office chief, LTC Ed Bennett, "This has proven invaluable in expediting external planning efforts and solving unilateral issues among a host of various supporting U.S. and Turkish agencies."

With the organization in place to effectively manage everything from logistics to training, the tempo of the operation increased dramatically. The first subkits began to arrive at the Kayseri factory in the spring of 1982, as did the initial heavy industrial machinery required from the U.S. Defense Industrial Equipment Pool. To the project officers, this marked the completion of one major milestone and the start of another. One immediate concern now was to provide storage for the kits at the factory. This was initially accomplished by using temporary outdoor storage, then supplemented by adding adjacent depot warehouses. Equally as critical was the installation of the heavy machinery and on-site training for the factory workers. These tasks were accomplished through the assistance of a Turkish cadre, previously trained at Anniston, and a U.S. consulting team hired by Turkey and headed by Mr. Ernest Brown from Anniston. Brown had recently retired from Anniston with 30 years of service, having been a key figure in the U.S. *M48A5* conversion program, prior to leaving government service. His expertise, as well as that of his late colleague, Dave Stanley, proved instrumental in the success of the project in the months to come.

The preparation of the Kayseri Factory dominated the early efforts of the Project Management Office. Turkey had negotiated for the purchase of additional kits which, by the late summer of 1982, were on the way. If these subkits arrived before the factory was ready, a monumental logjam would ensue, almost certainly causing a production start-up delay. Time was clearly the most precious of all commodities.

At Kayseri, the period between August 1982 and May 1983 was marked by intense activity. The heavy machinery had arrived and was installed under the supervision of Brown and Stanley. A new machine shop was built and specialized welder training was in progress under the supervision of personnel from the Anniston Army Depot. Concurrently, the project office was monitoring and assisting the efforts of the factory as well as looking down the road in terms of surveying the user training base, identifying spare parts and support tool requirements and studying technical data packages for possible future in-country production of some parts and components.

Although improvements to the Kayseri factory would continue well into the next year, by May, 1983 sufficient progress had been made to start production. Marked by a ceremony that was hosted by General Kemal Yamak, chief of staff of the Turkish Land Forces Command and attended by MG Pendleton and BG Orun, the first five *M48s* went on the assembly line on 10 May 1983.

While these first five tanks were not considered prototypes — they did serve to verify production procedures which were, up until this point, untested in Turkey. They also served as a learning exercise for the Kayseri factory workers.

With few exceptions, the production process went as planned. These first tanks established a cycle that would be repeated many times in the months to come. In essence, this cycle involved stripping both hull and turret to bare metal, remachining where required and adding on the subkits in a prescribed order.

Initial testing of the first five *M48A5T1* tanks (the *T1* designation to differentiate the Turkish production model) was completed in September 1983.

These tanks were accepted into the Turkish Army on 11 October 1983 during a ceremony attended by some very happy officers from the Joint Project Management Office — including LTC Tuncer Erki, the Turkish deputy project officer chief who had been with the program almost seven years. While this ceremony marked the completion of a major milestone, it in no way meant that the job of the project office and allied support activities in the U.S. and Turkey was over, or even reduced. User-level training requirements, the start-up of the second factory, in-country production of parts, operational testing of potential product improvements, and assisting with actual fielding of the tanks all lay ahead. The responsibility to organize and coordinate these tanks fell on the Joint Project Management Office.

Even before the first tanks entered the Kayseri production line, the project office was busy formulating and coordinating user and support level training. Required publications were identified and ordered. Additionally, arrangements were made with the Turkish armor and ordnance schools to translate these publications as they arrived. A total of 73 different types of technical publications were ordered with approximately 48 requiring translation. U.S. parts manuals did not require translation: they have been used in Turkey for many years, the soldiers referring to the appropriate part picture and stock number. Even so, the translation effort was a big job which required the efforts of five full-time Turkish officers at each school.

Of course, the availability of publications was only a small part of the total training requirement. Since the *M48A5T1* represented a technology departure from the gasoline engine and 90-mm gun on the *M48* tank, hands-on training conducted by experts in both automotive and turret maintenance procedures was essential. With the assistance of TRADOC, this training was provided by two Mobile Training Teams (MTTs) from USAREUR units. One team was designated to teach organization through battalion-level maintenance subjects at the armor school. The other was responsible for depot-level maintenance subjects at the ordnance school. Both teams consisted of four U.S. NCOs, ranging in grade from E-5 through E-8.

These teams arrived in November 1983. For the first week they worked in the project management office, becoming familiar with the program itself and preparing the necessary lesson plans and visual training aids they would need at their respective schools. The objective of the training was to teach a small school cadre, who would in turn become the principal *M48A5T1* instructors for new trainees attending these schools and selected cadres from units designated to receive the *M48A5T1*.

The actual training lasted through the first week in December, with a total of approximately 175 hours devoted to hands-on instruction at each school and using the first tanks produced by the Kayseri factory. This training also served as a second check of the factory's quality control procedures, with

feedback from the teams provided directly to the project office.

In May 1984, the mobile training team chiefs conducted a follow-up visit to Turkey. The purpose of this trip was to visit unit personnel who had recently completed *M48A5T1* instruction and provide assistance if necessary. This follow-up visit showed that they had done their initial training jobs well —no follow-on instruction was required.

For the project office, the maintenance MTT was only one of many events occurring during this period. Turkey now had kits for 920 tanks on contract, with credit funding for the program provided by the U.S. This allowed Turkey to take advantage of lower component costs by buying in quantity prior to yearly cost increases. Turkish industry was also gearing up to produce up to 36 of the 55 subkits in country. This meant that the project office had to maintain close interface with the various local producers to insure timely deliveries and head off production line delays. Additionally, the second factory was scheduled to come on-line by January 1984 in Arifiye, Turkey. This added to an already hectic work load.

While valuable lessons had been learned during the start-up of the Kayseri factory, the Arifiye start-up brought with it a whole new set of problems. Not the least of these was that it was changing over from a German-sponsored *M48* conversion program to begin the *M48A5T1* program. The entire transition was scheduled to be completed within 30 days and amazingly enough, this happened. The Arifiye factory came online as scheduled on 13 January 1984.

By the summer of 1984, the first *M48A5T1* battalions were fielded and both factories were climbing the learning curve in terms of producing more tanks each month, with fewer initial rejections due to quality control deficiencies. Although the factories were still below their monthly production goal of 20 tanks apiece, they were producing a quality tank and actions were underway by both the Turkish Land Forces Command and the project management office to obtain more manufacturing equipment and the additional factory workers needed to meet the 20-tank-per-month goal. These steps are now well underway, with the first group of factory workers now undergoing training at both factories and the additional equipment enroute from the U.S.

The first Turkish M48A5T1 rolls off the line at Kayseri factory.

In the future, the continuation of the conversion program for the remaining *M48* fleet appears to be a certainty, keeping both factories busy well into 1991. In the Tank Project Management Office, the support of the production efforts is a primary concern, but new horizons are also being explored. The addition of state-of-the-art equipment such as laser rangefinders, tank thermal sights, improved suspension systems, and add-on stabilization, are well beyond the planning phase with operational testing to begin shortly.

Although at this point it is impossible to predict just what the ultimate configuration of the *M48A5T1* will be, the intent is to make it a viable deterrent to any potential threat into the next century. Based on the success of the program thus far, and given the determination and initiative displayed by both Turkish industry and the Turkish Army, this appears to be an attainable goal. In fact, this program has been a model of cooperation between allies. U.S. industry, the Army Materiel Command, the Training and Doctrine Command, U.S. Army Europe and thousands of others have joined together with their Turkish counterparts to help produce a first-class fighting vehicle for the tough, dependable and combat-ready Turkish Army.

MAJOR FREDERICK J. MOLL, III, was commissioned in Armor upon graduation from Widener University in 1968. He has served as a tank company commander, an armor battalion S-3 and an armor battalion XO. He is a graduate of the Armor Officers Advanced Course, the Army Command and General Staff College, and holds a masters degree in Human Resources Management from the University of Utah. He is currently assigned to the Joint U.S. Military Misson for Aid to Turkey as a tank modernization project officer.

Who Should Control the Scout Platoon?

A common deficiency among battalion task forces rotating to the National Training Center (NTC) is the failure to effectively conduct reconnaissance and surveillance operations. This has been attributed by many observers to inexperienced and inadequately trained task force S2s (intelligence). While this point has some merit, in that second lieutenants of any branch are generally inexperienced and inadequately trained, it skirts the real issue, and that is: the task force as a whole fails to reconnoiter effectively. To what extent this is the fault of the S2 can best be determined by the extent to which he is given control of organic reconnaissance assets.

". . . If the scouts are lost during a high-risk delay or while defending an obstacle, the commander is blind. . ."

If the S2 merely advises the commander and S3 (operations & training) regarding the employment of the scout platoon and patrols, the fault lies not only ultimately, but also initially, with the commander. Whether the scout platoon, the task force's primary reconnaissance asset, is used to "see the battlefield," or is employed to enhance firepower will be decided largely by how it is assigned missions and controlled. If the task force commander controls the scout platoon, it will tend to become another fighting unit; if the S2 controls it, it will be used primarily for reconnaissance, and its survivability will become essential.

How does doctrine prescribe the relationship between the scouts and the task force staff? FM 71-2, "The Tank and Mechanized Infantry Battalion Task Force," is specific concerning scout platoon reconnaissance operations:

> "Usually the task force S2 coordinates requirements with the S3 and supervises the operation." (p. 6-3)

FM 17-17, "The Division 86 Tank Battalion/Task Force," further elaborates on staff responsibilities:

> "(The scout platoon) will normally be (under) operational control (OPCON) to the S3 when tactically employed. Although reconnaissance and patrolling requirements are developed by the S2, the platoon still operates under the supervision of the S3." (p. L-3)

However, this should be balanced against FM 34-1, "Intelligence and Electronic Warfare Operations," which states that:

> "(The battalion S2) plans and coordinates the operations of resources organic to the battalion and military intelligence (MI) battalion and field artillery resources supporting the battalion." (p. 2-23).

But doctrine is by definition not directive in nature, and the commander will assign staff functions in the manner he feels will best accomplish the mission.

Many commanders prefer to personally assign and direct scout platoons. While this is rooted in the correct perception that the scouts are the commander's "eyes and ears," it effectively excludes the S2 from the intelligence cycle. And, quite probably, the task force will continue to perform its mission, given a capable and experienced commander and an effective scout platoon. However, the ability of the task force to conduct protracted operations in the AirLand Battle will be degraded, because the commander will be operating solely on what FM 100-5, "Operations", terms "combat information," defined as:

> "...Raw data that can be used for fire or maneuver as received, without interpretation or integration with other data." (p. 6-5).

While *combat information* forms a large part of what the task force S2 does his job with, it lacks the predictive characteristic of intelligence that enables the commander to *anticipate* the enemy's future actions. The scout platoon will gain and maintain contact, and the task force commander will maneuver his forces to counter each new enemy disposition. At this point the commander has lost the initiative, one of the basic tenets of the AirLand Battle. This is not to say that a good commander cannot be his own S2; he can, and quite often must be. However, the more staff functions a commander performs personally, the less energy and concentration he can devote to commanding. And the commander, commanding from a tank or an APC, usually lacks the communications capabilities of the Tactical Operations Center (TOC).

The S2 can quickly synthesize the scouts' reports with those of subordinate, flank, and higher units, often establishing a clearer and more comprehensive picture of the enemy situation.

If the commander does not assume personal control of the scouts, he will usually delegate control to the task force S3. While there is no doubt that the scout platoon has valid combat and security missions, FM 17-7 reiterates that "the scout platoon's primary mission is seeing the battlefield." (p. L-1).

The S3's primary concern will always be with maneuver.

The hazard implicit in training environments such as the NTC is that the task force will tend to treat each mission as a set-piece. The task force is given a certain mission; for example, defend to retain. This carries with it the tacit admission that the opposing force (OPFOR) will be attacking. Thereafter, each spot report will either serve to confirm this course of action or will probably be disregarded. And with each rotation, maneuver commanders and staffs can "G2" the OPFOR and terrain, usually resulting in a misplaced confidence in their own analytic and predictive abilities.

All this serves to considerably dissipate the "fog of war," and can reduce the jobs of the S2 and S3 to so much gamesmanship. As a result, the S3 will downplay the need to "see the battlefield." He will regard the S2's emphasis on reconnaissance as an effort to "fine-tune" generally accurate estimates, and will instead be considering how best to employ the firepower possessed by the scout platoon.

This highlights another illusion fostered by the NTC: that combat units will be reconstituted after each mission by the simple expedient of carrying a casualty feeder report to the administration logistical operations center (ALOC). While this artificiality is necessary to maximize training opportunities, it has the result of deemphasizing the need to ensure the survival of the scout platoon. Combat has its ebbs and flows, but the ebbs cannot be presumed to fall as conveniently as those at the NTC.

The scouts most commonly move to "screen the flank," any flank, when the main battle is joined. At the NTC, where there is a finite force governed by rigid doctrine, the task force concentrates on the battle at hand, complacent in the certainty tht there will be few surprises. The task force's "eyes" are shut, while the scouts usually grab a few moments of much-needed sleep.

Because of the perceived need for little or no security during and immediately following the main battle, the S3 will view the scout platoon as a potent antitank force, which may be squandered once its initial desultory reconnaissance mission is accomplished. The assumption is that there will be adequate time to reconstitute before the night's mission.

But what are the implications for combat? If the scouts are lost during a high-risk delay or while defending an obstacle, the commander is blind. He is only aware of the forces he is in contact with.

And, *if* the scouts are reconstituted, with *what* will they be reconstituted? In all likelihood, green 19Ds straight from the replacement detachment. These will be no substitute for a well-trained and experienced scout platoon. And their inexperience and unfamiliarity with unit SOPs will not be their only handicap. Lacking any experience of working with these scouts, the commander will have no frame of reference for evaluating the reliability and accuracy of their reports. Spot reports two kilometers off are often worse than no report at all, and an *M151* identified as a *BRDM* can have costly results. The difficulties in working with attached infantry squads for the first time will be similar.

The bottom line is that the scout platoon is the task force's most precious organic reconnaissance asset, and probably its most productive source of intelligence. The commander who chooses to throw his scouts away in a combat mission has effectively sacrificed his ability to see the battlefield, and can only react to the enemy *as the enemy acts.* FM 17-98T, "The Army 86 Scout Platoon," reinforces the obvious:

> "If you don't know the enemy or terrain, you cannot operate effectively."

Both doctrine and common sense have shown us that the primary mission of the scout platoon is reconnaissance, and that it is paramount that it be reserved primarily for that purpose. This being the case, the scout platoon most logically should be OPCON to the task force reconnaissance and surveillance manager — the S2. The S3 does not plan patrols or ground surveillance radar (GSR) missions: why should he control the task force's primary reconnaissance force? As the S2 determines intelligence requirements and how they can best be satisfied, the commander's need for timely and accurate intelligence can most effectively be met by assigning the responsibility for planning and directing scout missions to the S2.

An immediate objection to this will be that the scouts are also a maneuver force, and as such must be integrated into the overall scheme of maneuver. This, however, will not be a problem if, first, the S2 consults with and informs the S3 of scout missions, ensuring that they are posted on all operations graphics and, second, the S2 and S3 shops continue to effectively interface. If the S3 is ignorant of patrols and of enemy dispositions, or the S2 is unaware of the location of friendly maneuver units, the task force TOC is completely ineffective. This problem will manifest itself in many forms besides the S3's ignorance of scout missions; not least of which will be the fire support element (FSE) being unaware of either friendly *or* enemy locations. However, if the S2 and S3 are planning as a team, and if the TOC is operating properly, the scout platoon will perform its mission in complete orchestration with the rest of the task force.

The question of communications will also arise. The scout platoon leader customarily controls his platoon on his internal set, and reports to higher headquarters on the task force command set. This creates several inconveniences. The scout platoon leader must waste several precious moments changing frequencies to report or to call for fire, a nuisance even when his AN/VRC-12 works properly. This also ties up the command net with potentially unnecessary traffic, increasing the probability that it will be intercepted or jammed. And when the task force command net is on radio listening silence, a dilemma results for the platoon leader, who must decide between not reporting or breaking listening silence upon encountering the first enemy scouts or obstacle.

The solution is to have the scout platoon leader report to the TOC on his internal net, while continuing to monitor the command net on his auxiliary receiver. The S2 will dedicate one of his receiver-transmitters (RT) to the scout net. (His other RT will be set on the brigade intelligence net, and the auxiliary will be on task force command or a line company internal.) This will serve several purposes: first, the time required for reporting will be cut drastically, as there will be no need for the scout platoon leader to change frequencies or to relay reports from subordinate sections. Second, priority requirements for fire can be delivered to the FSE within seconds. Finally, the S2 can speak directly to the platoon leader or section sergeant to clarify reports or requests.

Once the S2 has analyzed and integrated incoming reports, he can update the commander or S3 face-to-face (as one or both may still be in the TOC when the scouts's most effective reconnaissance is taking place), or he may choose to use the command net, breaking listening silence if needed. And while the scout net is as subject to intercept and jam as any other, it is far simpler to coordinate the change to an alternate for one platoon than for an entire task force, a trauma from which few battalion-size forces fully recover. The S2 can control patrols and GSRs on either the scout internal or the brigade intelligence net.

The advantages of using the scout internal net for reporting to the task force are obvious. Neither the commander nor the S3 is likely to have the time, the concentration, or the radios to continuously monitor this net, if they are to effectively control the maneuver units. The luxury the S2

possesses that they do not is that he can — in fact, must — devote much of his attention to the scouts. He is not primarily concerned with battle positions and engagement areas (although he must be thoroughly familiar with the friendly operations plan), and should be well-attuned to the reconnaissance aspects of scout operations.

By establishing a normal association between the S2 and the scout platoon, the commander can enhance every aspect of the scout platoon's training and operations. The S2 can compensate for the loss of the combat support company headquarters by facilitating combat service support for the scouts.

Because their mission requires them to move well forward of the forward edge of the battle area (FEBA), displacing often and discreetly, the logistical package (LOGPAC) system is inadequate to support them. The S2 can ensure that the headquarters and headquarters company (HHC) first sergeant knows when and where to deliver Class I, that the S4 (supply) knows their Class III and Class V needs, the S1 their personnel status, the HHC XO their maintenance status, and so on.

The S2 can also ensure that the scouts are properly trained in garrison, particularly in skills that will directly impact on their performance in the field, such as map-reading, vehicle identification, and reporting. He can integrate their training with that of his combat and electronic warfare intelligence (CEWI) slice, enabling the scouts and GSR teams to learn how to operate effectively together.

The commander can formalize this relationship by including the S2 in the scout platoon leader's rating scheme, either as a rater or intermediate rater (the HHC commander and the battalion commander would complete the scheme).

This would be appropriate where the S2 is a captain, as authorized, or otherwise ranks the scout platoon leader. The relationship would then be analogous to that between the S4 and support platoon leader, or the S1 and the medical platoon leader. This could be seen as a diminution of the status of the scout platoon leader, but would in fact be primarily an enhancement in the status of the S2. He would then have duties and responsibilities commensurate with those of the other primary staff officers. The battalion would profit immeasurably from this arrangement, as the S2 would better understand maneuver, while the scout platoon leader would have a better understanding of reconnaissance and the intelligence cycle.

Regardless of how the rating scheme is arranged, it is obvious that the scouts should be OPCON to the S2 in any tactical employment. If the commander is to have any reasonable expectation of a useful intelligence product from his S2, he must not deprive the S2 of the requisite assets to acquire that intelligence. If the S2 fails to effectively use the scouts to accomplish the task force's mission, he has also failed in his job as intelligence officer. However, before the S2 can be said to have either failed or succeeded in his job, the commander must furnish him the opportunity in a training environment.

DAVID L. IRVIN
Captain, USA
Fort Huachuca, AZ

A View of a Future Tank

The panoramic thermal sight had not picked up so much as a rabbit all night. "If any rabbits still exist in this godforsaken country," the crewman thought bitterly.

The tank crewman, Warrant Officer 3d Class Tom Kelly, 23-years old, had been watching his sector for the last three hours. The other tank crewman, Warrant Officer 4th Class John Oats, was asleep in the reclining chair across the armament console from Kelly. Oats is an old soldier, having served in the *M1* tanks at the beginning of the war. He was fond of telling Kelly that he never dreamed that one day he'd be fighting in a science-fiction machine with a draftee and Vicky.

Vicky was the third member of the crew. The Voice-Integrated Computer (VIC) was the latest generation of super computer. Heavily shielded from the effects of electromagnetic pulse, Vicky continually monitored vehicle maintenance status and the thermal, chemical, radiation, and laser sensors. Capable of speech and voice recognition, Vicky could give warnings, take instructions, and carry out simple orders.

In the mid-1980's, Vicky and, indeed the *M5 General Starry* tank, of which she was a part, would have been considered something possible only in the imagination of the leading science-fiction film producer of the time. In fact, the *M5* was fielded just six months after the war began. The technology, however, was based heavily on Department of Defense research and development programs begun in the early 1980s.

While watching his screen, Kelly was thinking back to the *M5* briefing he had received at Fort Knox. A picture of the *M5* flashed onto the screen and a voice intoned:

"The *M5* has an externally mounted, automatically loaded, and fully stabilized electromagnetic gun. An electromagnetic gun is nothing more than a magnetic slingshot capable of launching a projectile along a sixteen-foot rail from zero up to 10,000 feet per second. The kinetic energy projectile is simply two pounds of depleted uranium covered by a thin silicon jacket. This round is launched at the gun's maximum velocity of 10,000 feet per second. The gun also has a high explosive round that is launched at a mere 5,000 feet per second.

"With no chemical propellant, there is no smoke or recoil and little noise other than the crack of the hypervelocity projectile as it leaves the launch rail," the voice continued.

"The gun is coupled to the VIC computer that can instantly solve the minor ballistics problems of a high-speed round. Either of the crewmen has only to put the sight reticle on the target and tell VIC the type of ammunition and when to fire. The large field of travel of an externally-mounted gun and its relatively low weight give the weapon system superb stabilization at any cross-country speed.

"The two crewmen sit side by side in the hull of the tank, each with a panoramic thermal screen or *hunter* sight. Each

crewman has a smaller screen capable of receiving the video signal from the high magnification, reticled, thermal *killer* sight, or the video signal from the thermal driving sight. Conventional optics and periscopes, as you know, were abandoned soon after the war began. This was a result of the thousands of soldiers made permanently blind by enemy high-enegy laser beams.

"Each crewman has a joystick at his right hand to drive the vehicle. Push the joystick forward and the tank accelerates. Pull it back, the tank brakes. Move it left or right and the tank turns. Each crewman also has a joystick at his left hand that allows him to traverse the gun and secondary armament on target. We have found that most *M5* crewmen grew up with video games and make the transition from "Tank Destroyer" to the *M5* easily," the voice went on.

"The *M5's* secondary armament consists of a rapid burst antipersonnel crystal laser with a wide, blinding, or a narrow killing, beam. It also carries a more powerful but slower burst chemical laser for soft targets and aircraft.

"The *M5* is powered by a fuel-efficient ceramic-lined turbine engine. Thermal suppression equipment and crew-launched thermal grenades provide protection against heat-seeking missiles. The tank is equipped with a small turbine auxiliary power source for use when the tank is not moving.

"The main powerpack and the state-of-the-art track and suspension allow the 35-ton *M5* to move cross-country at speeds over 50 mph and give it a range of 300 miles. The pressurized fuel system allows the *M5* to be completely refueled by an armored rearm/refuel vehicle in minutes. During fueling, the *M5* can simultaneously take on its entire basic load of 200 main gun projectiles directly into the autoloader.

"The *M5's* special armor, location of fuel and storage cells, and the small crew space give this tank 360-degree and top-attack survivability against all but the heaviest munitions. The tank is painted with a thick paint that smokes heavily when hit by a high energy laser, thus diffusing the beam. The paint also reduces the tank's radar and thermal signatures and is impermeable to chemical agents. The *M5* has a filtered, air-conditioned overpressure system and a radiation liner.

"The *M5* crewman's uniform was designed to provide additional NBC protection. The uniform is fireproof, radiation resistant, and capable of internal pressurization and cooling. Normally, the combat vehicle crew (CVC) helmet visor is left open and the suit unpressurized when the hull overpressure system is functional. The uniform also contains a medical probe capable of monitoring the crewman's medical condition as well as injecting stimulants, painkillers or sleep-inducing drugs."

When Kelly first heard that briefing it seemed unbelievable, but now this miracle of technology he was sitting in was accepted as a matter of course. Since the war began, a united and aroused America had produced many miracles.

"Alert! We are being lased by an enemy low-energy laser from azimuth 218," the mechanical, but definitely female, voice announced in Kelly's CVC earphones.

"Vicky, lock main gun on laser source, fire two smoke grenades, wake up Oats," Kelly replied as the turret and *killer* sight turned rapidly to the azimuth Vicky indicated. Just as the smoke grenades exploded, a loud clang vibrated through the tank. "Tank identified as a *T88*," Vicky calmly stated. "Roger," replied Kelly. "Fire KE round." Other than the whine of the electric capacitors as the electromagnetic gun fired, there was no indication that a bolt of uranium was on its way to the enemy tank. The target effect, however, was spectacular as two pounds of dense pyrotechnic metal impacted at a speed of over 7,000 mph against the hull of the enemy tank.

"Sensors report secondary explosions on target, no other targets detected. We received a hit from a KE round on hull panel 4 with only surface damage," Vicky announced.

"Roger. Start main engine, shut down aux power," Kelly said, relieved that there wasn't more damage.

"Junior, you were a little slow but I guess you hit it," Oats drawled, still groggy but rapidly recovering as the stimulant from the medical probe entered his blood stream.

"It was a *T88*, no other target identified. It must have been lost or on a suicide probe. I'm getting ready to move to the alternate position," said Kelly.

"OK, I'll send a report to the captain," said Oats as he punched the keyboard of the position location reporting system that gave him the location of the company commander's *M5*.

"Vicky, lock the directional antenna on the commander's position," said Oats, as the tank started moving to the new location.

"Six, this is 33. We got one *T88* at grid ZA237842. It appears to have been a probe. No other enemy identified. We are moving to our alternate position," said Oats crisply. The young company commander responded, "Roger. Keep me informed. We still launch the patrol in four hours."

"Roger, out," Oats replied.

Now in the new position, Kelly heard Oats say, "Get some sleep. I think Vicky gave me too damn much juice, and I won't be able to sleep without another jab in the butt for days."

Without protest, Kelly adjusted the seat back and said, "Vicky, let me sleep for three and a half hours." He felt the probe give him the exact dose of barbiturate and heard the soothing sounds of his own brain's alpha waves echoing through his CVC as he floated off to sleep.

This story may never happen. The development of an *M5* tank like the one described may or may not be probable, but it is possible with technology available today and coming up tomorrow. Here are a few examples: The Air Force is experimenting with a VIC-type computer interface for its fighter planes. The computer power to run a VIC is just around the corner. Thermal sights, chemical radiation, and laser sensors are available with today's technology. An externally-mounted gun has been tested and the electromagnetic gun is on the drawing board. The side-by-side seating arrangement, complete with joysticks and *hunter/killer* sights have been tested in the AII Corporation's High Survivability Test Vehicle, Lightweight (HSTVL). High-energy lasers are available today. The ceramic-lined turbine engine is under development at R&D centers. Multipurpose paint is in experimentation. A tank overpressure system is now available. The technology to develop a crewman's uniform, like the one described, exists today. Neither the medical probe, nor the drugs mentioned, exist today, but it should only be a matter of time before they are available. The position location reporting system is now under development.

All these technologies are possible. All will be expensive. In the short term, few will be reliable. But to believe that a country that can put a man on the moon and develop a complex space shuttle cannot build an effective and reliable *M5*-like tank, at best, is short-sighted.

Sooner or later, the U.S. Army will have such a tank. Are you ready to tactically deploy it? We are not really sure how we are going to fight our latest tank, the *M1*. We need to get ready soon to develop tactics for the next tank that comes along.

RICHARD P. GEIER
Major, Armor
1st Armored Division

Improving the Training Approach

The TRADOC mission — to prepare the Army for war by training combat-ready soldiers — is undergoing a shift in focus.

For the past eight years, the focus has been on training the individual soldier. We've accepted the rationale that we can identify, classify, and categorize the skills that make a good soldier, and that this training, with proper sustainment, would prepare him to perform with a unit. The emphasis on the individual resulted in the present task-based, performance-oriented training system.

TRADOC's perspective is now shifting from the needs of the individual soldier to the needs of the unit he will join. As a result, training developers must adjust their analysis and course development to place the stress on preparing combat-ready units, rather than just well-trained individuals.

The reason for this shift is the realization that individual proficiency does not necessarily translate into unit effectiveness. While there may be situations where data can be manipulated to show positive correlations between individual skills and collective skills, variables in unit performance, as demonstrated in Lebanon, Grenada, and Central America, indicate that our approach to training and fighting as units can be improved.

Those who plan the Army's training can do a better job of determining the requirements for unit success if they take a systems approach. Better analysis can be accomplished through four basic changes:

- Modify the current analysis approach.
- Adopt a proactive training approach.
- Train for success.
- Bond soldiers to quality leaders in cohesive units.

Performing Better Analysis

In a nutshell, this change is not revolutionary, but a natural maturation of our analysis of individual training needs. In the past, we've determined what we think soldiers need to know to be successful in combat, and then developed our training programs to suit these needs. What we have not done is to recognize that *units* are responsible for major actions and that success is measured by the *unit's* proficiency in combat missions and operations.

Improved analysis would disclose all major unit actions and their supporting tasks that are absolutely critical to mission accomplishment.

There are, for example, some unit actions; i.e., critical combat tasks, that support mission accomplishment, while there are others that do not directly contribute to combat success. The analysis, then, examines the concept of *unit combat success* in terms of *actions* that the *unit* must take to conduct successful combat missions. The training developer can then analyze the *collective activities* necessary to accomplish each unit action. From that analysis, he determines the *collective skills* that must be mastered in order for the crews/teams to contribute to successful unit actions. *Individual skills* are then derived and taught based on the critical collective skills. This front-to-back analysis, then, pulls together a training system based on analysis of the unit actions necessary for combat success, the collective activities necessary to accomplish the unit actions and the collective and individual skills necessary to perform the collective activities. Each level of this building block approach is based on a solid tier supporting it.

The analysis must start with the unit's mission requirements. The training program must not define the unit's mission capabilities, but *vice-versa*. When we can attain this level of sophistication in our analysis, we can be reasonably sure that our training thrust, beginning with IET, will reflect a strategy of preparing an individual to be part of a successful fighting team.

The Proactive Approach

This second change for better training means, simply, that training and training strategies meet the needs of the unit on the future battlefield, developing at the same pace as we implement new equipment, organizations, and tactical doctrine. Although we have given lip service to this perspective, trainers are still reactively searching for training approaches that maximize the capabilities of new weapon systems, the most recent example being the fielding of the *M1*.

This change will require us to look ahead while doctrine, weapons, and organizations are still evolving, in order to be prepared to field appropriate training when these other innovations go into effect. We must previsualize the variables of the future and be prepared to predict what Army training requirements will be. We will have to assess the potential of the country to produce the required number of soldiers with sufficient training to successfully employ the extremely sophisticated weapons of the future. In other words, we must be able to describe how the Army will perform if everything works out as expected.

By previsualizing the future needs of the Army, we can identify problems before they occur and take advantage of new training innovations in time to use them. A way of thinking about this is that the trainer, in effect, wargames future training using the variables of mission requirements, tactical doctrinal change, advances in weapon technology, and the personnel available.

Training for Success

The third approach to better training involves training for success. What makes this especially difficult is that the definition of unit success in peacetime is usually different than the clearcut challenge faced in actual combat. Peacetime training offers very limited opportunities for a unit to react to the changing nature of the battlefield. This problem is long-term in nature and solutions — like the force-on-force simulations of the National Training Center — tend to be expensive.

The first step in dealing with the problem is to define unit success on the battlefield of today and the immediate future. Once defined by the training proponent, these definitions of success help clarify the mission area analysis and drive the battlefield development plan.

Ultimately, these same techniques of unit mission analy-

sis, when applied to MOS training, will identify the high-priority individual tasks and the skills required to perform those tasks. Training for success requires this analytical approach so that scarce training resources will be applied to teaching only those highly critical fighting skills required for individual and unit success on the battlefield.

Application of this analytic technique will involve training and drill in the critical skills for critical tasks, instead of just training for individual competency in skills that are not based on unit mission requirements.

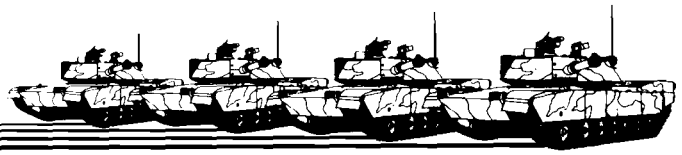
Nurturing Cohesion

The final and most significant aspect of better training is the need to create cohesion among unit members. Cohesion is created and sustained by common values, up to and including belief in the American way of life. But, the most relevant day-to-day bonding within the military revolves around a soldier's unit and his contribution to that unit. In the final analysis, training methods, doctrine, and equipment could be useless unless the soldier is willing to be part of the team. His allegiance to the unit, its mission and its leaders, can only be nurtured through performance-based leadership. No leadership theory can ever replace leading by example and showing concern for the soldiers and their families.

Conclusion

We face challenges if we are to field total systems composed of proficient units manned by skilled soldiers who are confident in their ability to fight and win. We must reexamine our mission analysis methodology and adopt a systems approach to training for critical combat skills. We must become proactive in our analysis of mission requirements in order to keep pace with new doctrine and equipment. We must develop leaders who can determine training requirements as well as implement our fighting philosophy and fighting doctrine. We must have a clear picture of what constitutes success on the changing battlefield and use this perspective as our guide in designing 21st Century training.

CHARLES S. DUNCAN, PH.D.
Lieutenant Colonel (P) R.C. HARTJEN
HQ, TRADOC



The Use, and Abuse, of the SOP

The unit SOP has been with us a long time. Increased emphasis has been placed on the SOP in recent years, but there still is no clear purpose for the SOP. The many that I have seen are best characterized by a statement made by Albert Einstein, "It seems to me that perfection of means and confusion of goals seem to characterize our age."

Without a clear goal, anything assembled can be called an SOP. Is there a need for a unit SOP? What is a unit SOP? What should it do? Should there be one for each level of command or only at selected levels? Is it best to standardize these SOPs Army-wide? Until these questions are answered, no SOP could hope to be an asset to unit operations except by accident or by trial and error.

The first question is easy to answer. During field operations the problem of "what do we do next?" arises. The soldier's manuals and crew drills tell us *how* to do it, and the field manuals tell us *what* to do, but neither tells us *when* to do it. As an example, the field manual tells us most of what must be done to occupy an assembly area, but does not list the sequence in which these actions are performed.

You say that we should know, but how many units have a different order in which actions are performed? As things stand now, we must figure out that sequence. Occupying a battle position, feeding on a battle position, reorganization after combat, and many other SOP-oriented problems lack an SOP.

With the first question answered, the second can be dealt with. There is a need to establish the sequence in which soldier's manual skills and crew drills are performed to accomplish tactics as laid down in the field manuals. There are some items that do not fall into this category which do need , however, to be included, such as sleep plans.

Based on this, it is possible to say that a unit SOP "is a standardized sequence of skills, drills and methods." Is this all there is to a unit SOP? No, because if that were so, we could standardize everything and there would never be any question about what to do. There is a problem: total standardizing is much too dangerous. If the success of a sequence of tasks is 'easily' affected by changes in equipment or battlefield conditions, then it should not be in an SOP. Ignoring this fact can result in losses of troops and equipment. If the enemy can figure out what you are going to do, he will be waiting for you.

As an example, look at how vulnerable the Soviet Army is just because of its extensive standardization.

Now the third question. What should a unit SOP do? With the above in mind, let us look at a complete definition to find the answer. A unit SOP is a standardized sequence of soldier's manual skills and crew drills or unit drills, and methods of operation that are not dependent upon equipment or the enemy for their success.

If a unit is going to occupy an assembly area, the sequence of events that occur is performed in the same order, regardless of the type of unit. The soldier's manual skills and crew drills account for the equipment, and the choice of the SOP used accounts for the enemy. The SOP does not need to change. Many current unit SOPs restate what is written elsewhere. This should be eliminated or kept to a minimum. Skills, drills and tactics are well-detailed in other manuals.

Somewhere a line *must* be drawn as to what must be committed to memory; otherwise, an SOP becomes nothing more than a condensed version of all other manuals. I do not foresee a small cart being issued to carry such a book.

Many items now in unit SOPs do not belong there. How to wear the uniform, or what to wear, somehow escaped being in the common skills manual. How they escaped, I have not

figured out. If an item or skill is not used in the field, it does not belong in a unit SOP. If it is a listing of individual skills, it does not belong in a unit SOP. Only how individual skills and crew drills are *collectively* used in sequence should be in a unit SOP. KIS — Keep It Simple, is still the best way. We tend to lean to the complex.

A commander decides which SOP, or combination of SOPs, he wants to use to accomplish a mission and issues his orders. Unit SOPs are not missions, but tactics to accomplish the mission. The tactics are broken down into soldier manual skills or crew drills and these are listed in the sequence in which they are to be performed. The following is a notional SOP for occupying a battle position by a cavalry platoon (non-armored).

A. Scouts check area under overwatch of tanks. Mortars set up on platoon's secondary BP and act as its security.

B. Forward OP/LP is set up. It remains in place until enemy ground forces are sighted, concentrated artillery is received, or it is ordered to retire.

C. Scouts report clear if nothing is found and the armor moves up.

D. Platoon leader determines TRPs, kill zones, and gets location of OP/LP from scout section leader.

E. Platoon leader tells platoon sergeant and scout section leader their section's fields of fire and passes on the location of the OP/LP and the TRPs.

F. Platoon sergeant and scout section leader tell vehicle commanders their fields of fire and the locations of the OP/LP and the TRPs.

G. Platoon leader makes a position sketch which is delivered to the CO within one hour and determines withdrawal routes to the next platoon position.

H. Vehicle commanders position their vehicles and make range cards to be delivered to the platoon leader within thirty minutes. Priority of positioning is tanks, carriers, scout jeeps. Concealment, cover, and fields of fire are balanced. Each vehicle commander coordinates overlapping fields of fire, coverage of dead space, positions, and routes to them with the vehicle on each flank. Platoon flank vehicles contact the flank vehicles of adjoining units and do the same.

I. Vehicle commanders deliver the first range card to the platoon leader and are told the routes of withdrawal to the next platoon position, and the routes inside the position.

J. Vehicle commanders select two additional positions and follow instructions in H, plus determine routes to the main route of withdrawal.

K. Vehicles move back to primary positions when finished and deliver the two range cards to the platoon leader. When all vehicles are in primary positions, all engines are shut down simultaneously, on order.

L. Set up NBC alarms.

M. On order, the platoon leader's driver lays wire to each vehicle to establish a hot loop.

N. Obstacles are emplaced as directed by the troop commander.

O. Do "after operations" checks.

This may seem like a load, but it goes quickly and allows a unit to efficiently occupy the position.

The fourth question is difficult to answer. To my knowledge, the company troop-level SOP should eliminate the platoon, section or squad SOP. Since staff functions are basically the same, they need an SOP. The different levels (Bn, Sqdn, Bde, Div, Corps) may need additional items, but not many. I see no need for anything other than a staff SOP above company-troop level. Too many changes would have to be made to make any SOP work in battle at the lower levels.

The last question is easy: YES! YES! YES! The problem is that too often the higher command establishes an SOP for the lower unit. While it would seem that command experience would improve the product, it is often the opposite. Those using the SOP should design and walk it through several times while the higher command grades it. Just because it is different does not make it wrong. There is no one best way to do most things.

The unit SOP also eliminates a gap in training. The gap that exists between tasks/drills and tactics also exists in training. How do you train troops in tactics when the connection with soldier's manual skills and crew drills is missing?

As a training tool, the unit SOP provides another step where before there was a leap. Soldier's manual skills to crew drills to unit drills (from the unit SOP) are mastered one at a time. This is the well-known crawl-walk-run training mode. These can be used by a commander to measure how well the unit is trained. Everybody knows what is expected and repetition can be used. This is how the *Wehrmacht* trained its troops to such a fine edge.

It must be remembered that the unit SOP is only a tool to accomplish a mission. A tool is something to be used, not dwelled upon. The purpose of standardization and uniformity is interchangeability and interoperability to increase efficiency of performance. The unit SOP is such a method.

CHRISTOPHER F. SCHNEIDER
Staff Sergeant, Armor
Cicero, IN

Recognition Quiz Answers

1. **M728CEV (U.S.)** Crew, 4; combat weight, 52,163 kg; maximum road speed, 48.28 km/h; maximum road range, 500 km; fording, 1.219 m; 12-cylinder, 750-bph diesel engine; armament, 1 x 165-mm demolition gun, 1 x 7.62-mm coaxial machinegun; turret armor (front) 120-mm.

2. **M559 Fuel Tanker (U.S.),** Crew, 2; 4 x 4 drive; loaded weight, 20,797 kg; length, 9.931 m; capacity, 2,500 gal; maximum road speed, 48.28 km/h; maximum road range, 650 km; 6-cylinder, turbocharged 213-bhp diesel engine.

3. **M9 Armored Dozer/Scraper (U.S.),** Crew, 1; length, 6.248 m; over-track width, 2.692 m; height, 2.36 m; maximum road speed, 483. km/h; maximum road range, 322 km; fording, 1.83 m; 295 bph diesel engine; aluminum armor.

4. **M551 Sheridan (U.S.),** Crew, 4; combat weight, 15,830 kg; maximum road speed, 70 km/h; maximum range, 600 km; 6-cylinder turbocharged 300-bhp diesel engine; armament, 1 x 152-mm gun/Shillelagh missile launcher, 1 x 7.62-mm coaxial machinegun, 1 x 12.7 antiaircraft machinegun.

5. **Challenger MBT (U.K.).** Crew, 4; combat weight, 60,000 kg; maximum road speed, 56 km/h; 12-cylinder, 1,200-bhp diesel engine; armament, 1 x 120-mm main gun, 1 x 7.62-mm coaxial machinegun, 1 x 7.62 antiaircraft machinegun. Chobham armored.

6. **FV 434 ARV (U.K.).** Crew, 4; weight, 17,750 kg; maximum road speed, 47 km/h; maximum water speed, 6 km/h; maximum road range, 580 km; fording, 1.066 m; 6-cylinder, multifueled, two-stroke 240-bhp engine; maximum crane capacity, 3,050 kg; armament, 1 x 7.62-mm machinegun, 1 x 7.62-mm Bren gun; armor, 6-12-mm.

REGIMENTAL NEWS

Private Ronald E. Shock

"Home-Station" Training for Graf

Tankers in the 3d battalion, 64th Armor, 3d Infantry Division at Schweinfurt, FRG, are undergoing special training for their upcoming session at the Grafenwoehr Ranges.

"This kind of training gives us a chance to sharpen the skills of each crew member in an atmosphere as close as possible to what we will encounter at Grafenwoehr," said SFC Harlan L. Mitchell, battalion master gunner.

"This is a must," said Mitchell, "It gives the entire crew a chance to know each other."

The 3-64, like all other armor units, is plagued with personnel changes and "it's possible," Mitchell said, "to go to gunnery this year with a crew and find yourself the only man left in that crew next year.

"We have to remain ready to do our job, no matter what," Mitchell added.

One training device is the "snake board," a fence with wavy stripes of engineer tape tacked to its surface. Private 1 Ronald E. Shock, a gunner in Company B, said the practice is to follow the wavy tape with the main gun sight, thereby learning how to follow a moving target.

Shock, who has just completed transition from an *M-60* driver to *M1* gunner, said, "This will improve my gunnery."

A normal day's training on home-station gunnery lasts from 0730 until 1640 when they break for supper. Then it's on to classroom training until 2000. "It makes for a long day," said Shock, "but it's the way it has to be if we intend to do our job."

The Tank Crew Practice Course is seen as the most beneficial part of gunnery training as it involves the whole crew training as a unit. "Everyone has to work together during this course," said Shock.

SFC Mitchell said that the home-station training also gives the tank commander a better idea of which soldier will do the best job and what job that soldier should be given.

"Our main goal is to get the soldiers to a point where they are so proficient at their jobs that they don't have to think through a situation. . . it'll just be second nature," said Mitchell.

2-1 Cav Blackhawks Parade Varied Talents

The winter months saw the two ground troops of the 2-1 Cavalry successfully complete two CFV gunnery runs, qualifying all sections in the squadron. Also, platoon ARTEPs were completed and C Troop (Air Cav) successfully completed their III Corps Aviation Resource Management Inspection.

In November, the squadron won the 2AD unit 10K run with only one dropout from 394 starters. Later, the squadron won the 2AD Commander's Award for athletic excellence and CSM Albert J. White accepted the award from Major General Richard Scholtes, 2AD commanding general.

CSM White accepted yet another trophy, the III Corps Commander's Trophy, from Lieutenant General Walter F. Ulmer, III, when 2-1 Cavalry won the corps-wide NCO competition.

Also, SSG Mark J. Wornom was recognized as III Corps NCO of the Quarter for the last quarter of 1894 and SSG Wornom soon after was recognized as the 1984 Corps NCO of the Year. Last, but far from least, B Troop, 2-1 Cavalry, was recognized as the Best Maintained Unit (Heavy Category) for III Corps and Fort Hood in 1984. The troop, commanded by Captain Thomas J. Begines, will enter the competition for the Best Maintained Unit in FORSCOM.

B Troop is scheduled to go to Fort Hunter-Liggett, CA for three months to assist in testing the *DIVAD* weapon system. An FTX is slated for March along with troop ARTEPs. Bradley and helicopter gunnery are also scheduled.

1-77th Armor Ends 5-Day ARTEP

M60A1 tanks and some 2,000 support soldiers took part in a recent 5-day ARTEP (Army Training & Evaluation Program) held by the 1st Bn, 77th Armor at Fort Carson, CO.

The annual training and evaluation exercise saw two battalions of infantry, including support elements of the 4th and 52d Engineeer Battalions, 4th Medical Battalion, 1st Battalion, 29th Field Artillery, 104th Military Intelligence Battalion and the 4th Battalion, 61st Air Defense Artillery taking part. Also included was an Air Force liaison squadron of A-7s from Buckley AFB, Denver.

Using MILES (Multiple Integrated Laser Engagement System) equipment, both sides scored and recorded hits on opposing forces and equipment during the two defense and two attack missions held during daylight and night.

ARTEP evaluators were officers, senior non-commissioned officers and platoon sergeants from the participating units. In addition to simulated battle losses, vehicles that broke down became the responsibility of maintenance personnel who were also judged on their efficiency during the ARTEP.

Engineers constructed obstacles, planted simulated mines and protective berms — and then destroyed them as the battles progressed.

Because personnel injuries do occur during realistic training, a medical evacuation helicopter stood by during the exercises.

First Round Hit Is Tanker's Aim

At gunnery practice, a gunner's skills earn points. In combat, the gunner's skill is the difference between life and death. The "first round hit" is vital in both cases.

For example, take the crew of tank A-13 from the 2-81 Armor, commanded by SSG Charles L. Henderson. "If we go to war," the sergeant said, "soldiers will need to know how to operate and fight the tank and its weapons systems."

Simulator training is valuable, the tank commander said, "but until you actually do it with everyone doing his job, it's not going to be 100-percent proficient. That's why gunnery is so important."

Tank crews fire every weapon from main gun to machineguns during the Table VIII engagements at Grafenwoehr, West Germany. Prior to range firing, they boresight their main guns and practice dry firing.

"We boresight the weapons everytime we go to gunnery," said SGT Ivan Rodriguez, A-13's gunner. "It's important that we keep the system up to ensure that we get the first round hits."

SP4 Reginald A. Bolt's duties as tank driver are as important to good tank gunnery as is correct sighting and fire commands. "Rocking (the tank) or locking it up (jam stops) or not being steady during the running portion, increases the odds against the crew of not getting the valued first round hit," he said. "It's my responsibility to know that when the tank commander gives his fire commands, I have to stop or slow down enough so the gunner can maintain his sights on the target to get that hit," the specialist added.

New standards of qualification have been introduced and they are tougher than the old ones.

"The new standards aren't impossible," said Henderson a nine-year tank veteran, "they're tougher. . . You just have to practice more often, that's all."

In the end, complete crew integration and cooperation lies behind the 'first round hit' aim of all tankers.

PHOTO: SP4 THOMAS MOFFIT

The ACE-9 Armored Combat Earthmover has been undergoing follow-on evaluation tests at Fort Hood, Texas, and Fort Polk, Louisiana, to determine if the vehicle can support and maneuver with M1 tanks and M2 ICVs in an FTX situation. Unlike bulldozers now in use, the ACE-9 does not require towing on a flatbed trailer.

CARC Paint Adopted By Army

Chemical Agent Resistant Coating (CARC), which consists of an exterior coat of polyurethane paint and interior epoxy paint must be applied to Army equipment as soon as possible, according to the Department of the Army.

Why the change? The conventional lacquer and enamel type paints now used were found to soak up chemical and biological agents. In many cases, this meant that in order to decontaminate equipment all the paint had to be removed. This is cost prohibitive and often the stripping process tended to corrode the equipment.

The Army has adopted Polyurethane Paint, per MIL-C-46168, as the CARC for all Army equipment. The thorough and compact catalytic structural bonding of polyurethane paint renders it impervious to chemical threats as well as for most biological agents. Also, CARC lasts longer, which means fewer repainting and touch-up jobs.

Japan Reveals New MBT

The Japanese Self Defence Agency has announced a new MBT for that nation. Called the TK-X, the new tank will replace the Type 61 now in service.

The new tank will weigh 47 tons, have a 120-mm smoothbore main gun, an advanced fire control system and a thermal night vision/sight system. It will have a 1,500 hp diesel engine and a maximum speed of about 70 km/hr. An automatic hydro-mechanical transmission will be included as will hydropneumatic suspension. Armor will be a composite type based on ceramics consisting of multiple hexagon-shaped plates.

Safer Ammo For Tanks

Ammunition, the life-blood of the fighting tank, can also be its death knell if struck by penetrating fragments or an antitank missile. The Ballistic Research Laboratory at the Aberdeen Proving Ground, Md., is working on a safer type of tank ammunition that promises a drastic reduction in tank losses by preventing internal ammunition explosions.

The current main gun ammunition propellant, M30, is highly vulnerable to fire and explosion and a new mix called LOVA-X1A is being tested as a replacement. This propellant is composed of HMX, a high explosive finely ground and dispersed in an inert polymer binder. The test shells have proven to have a lower vulnerability to hits and at the same time provide the same ballistic performance as the M30 rounds.

The joint Army-Navy development program is working on first-generation LOVA ammunition for the 105-mm tank gun. Development is expected to be completed by September and if the new propellant is acquired by the Army, a spokesman said that "tank crewmen in the second half of this decade should find themselves using a far safer, but equally reliable and effective, ammunition."

Commanders, instead of losing multi-million dollar weapons systems and trained crewmen as a result of internal explosions of on-board ammunition, should be able to recover and repair upwards of 50 percent more vehicles with a corresponding decrease in crew casualty rates, the laboratory announced.

"Quick-Fix" building interior showing a pair of "Duster" twin 40-mm antiaircraft vehicles. The 50-by-35-by-17-foot building was erected by six men in eight hours, using only common tools. Erected at Fort Riley, Kansas, the $9,000 building was viewed by representatives from various Army commands who saw in it the possibility for an easily-assembled, temporary shelter that could fulfill many purposes.

Instant Shelter from "Quick-Fix"

Capable of being quickly & easily assembled by inexperienced crews, a new type of temporary building called "Quick-Fix" may help solve the Army's requirement for temporary shelters for equipment and personnel.

The building resembles the Quonset hut of WW II, but can be heated and insulated if desired. Six men erected the pictured building in eight hours using only common tools, plus scaffolding.

Killer Tank Crew Praised

Hard-core tank gunnery training, combined with seldom-seen battlefield ingenuity and plain intestinal fortitude, racked up 25 "kills" and the plaudits of his brigade commander for a staff sergeant tank commander of the 194th Armored Brigade at Fort Knox.

SSGT Vern McIlwain, tank Commander, Co. B., 5th Bn, 33d Armor, showed the stuff he was made of when his tank, "Duckbuster", fought a last-ditch battle against the OPFOR at the National Training Center at Fort Irwin, California.

His crew stuck with him, each man showing his own brand of personal courage in the mock battle that was almost too realistic.

"This is the first time I ever encountered maneuvers like these," said Sgt. Kenneth Myles, "Duckbuster's" gunner. "We popped smoke at our position, moved through the smoke, fired, and moved back into the smoke. It was a great lesson in tank fighting that I will remember when I become a tank commander," he said.

Using the smoke, shoot, hide technique, "Duckbuster" wiped out the first assault company that came against them. Then they were warned of a second echelon attack and shot up five more "enemy" vehicles before running out of ammunition.

"We moved over to three other tanks that had been "killed" in the fight and grabbed their ammunition, said McIlwain. The intrepid crew salvaged a dozen rounds from the "dead" tanks and fought the enemy's third attack echelon.

The "Duckbuster's" driver, Pvt2 Phillip Chumbley, said the attack was so realistic he was 'scared.' "All I could see was about 40 Soviet vehicles coming at us. I was kind of scared and wanted to stay alive," he said.

Pvt2 Frederick Crume, loader, came in for his share of praise after the action. "As I was firing," Myles the gunner said, "Crume would look through the tube, see a target, and start hollering at me to fire."

The "Duckbuster" finally succumbed to a *Sagger* hit, but not before it had fired its last round.

"We had to fight where we were," said McIlwain. "We had minefields to our right and the enemy to our front and left. We think we got about 25 "kills." We fired our last round and were "killed" by a *Sagger* round. We couldn't do anything, there were about 20 BMPs around us."

Such fighting prowess won outright praise from Colonel Paul E. Funk, 194th Armored Brigade commander. "That's the kind of guy we want," the colonel said. "I'll take him with me anytime."

BOOKS

THE HEIGHTS OF COURAGE: A TANK LEADER'S WAR ON THE GOLAN HEIGHTS

by Avigdor Kahalani. Greenwood Press, Westport, CT. $27.95. 198 pages.

In the Yom Kippur War (October 1973) Israel was invaded by Syria and Egypt on two fronts. Despite early losses, Israel outfought both opponents in that brief and bloody war.

It was a war fought primarily by tank units and the author, then a tank battalion commander on the Golan Heights (now a brigadier general), recounts the personal endeavors of his men, their fears and ambitions as well as their emotional and physical hardships. He describes the Israeli armored force's initial setback and their final advance to within 40 miles of Damascus, capital of Syria.

The book presents an essential means for studying and analyzing leadership, combat situations, and the military history of Israel.

It is also a gripping tale of battlefield action on the Golan Heights. Described in great detail is the Israeli containment action which lead to the offensive that penetrated so deeply into Syria.

ARMOR Staff

WEAPONS OF THE FALKLANDS CONFLICT

by Bryan Perrett. Blandford Press, Poole, England, 1982. 152 pages. $6.95.

The Falklands Conflict spurred a number of books and articles, most of which are descriptive overviews of the campaign, particularly as seen from the British perspective. Recently, the U.S. Naval Institute Proceedings has provided some very interesting narrative accounts from the Argentine viewpoint.

Perrett's book describes the various weapons sytems used by both sides and notes some of the shortcomings quickly felt by the protagonists, such as the British need for AEW capability to detect Argentine air raids at long range. Some surprises were registered such as the very excellent air-to-air effectiveness of the British "jump-jet" Harriers and the extremely quick modification of British aircraft to meet urgent needs such as for air-to-air refueling capability. Old lessons were relearned, sometimes painfully, by both sides. One of these was the need for "conventional" tube artillery such as the very effective 4.5 inch British naval gun, the 20-mm and 35-mm light automatic cannon used by the Argentine ground forces and the modern radar-guided *Phalanx* close-in weapon system (CIWS) hastily procured from the U.S. by the U.K. to employ as a last-ditch shipboard weapon against sea-skimming missiles of the *Exocet* type and Argentine aircraft engaged in low-level bombing runs.

ARMOR readers will be interested in Perrett's observations on the use of wheeled and tracked AFVs, helicopters, light aircraft (such as the Argentine *Pucara*) and the highly effective British employment of small complements of special operations forces.

JOHN A. HURLEY
Lieutenant Colonel, USAFR
HQ USAF

A QUICK AND DIRTY GUIDE TO WAR

by James F. Dunnigan and Austin Bay. William Morrow & Co., New York. 415 pages. $17.95

James F. Dunnigan and Austin Bay, two serious scholars, designers of military simulations and students of war, have given us a "briefing format" view of 20 areas of current conflict and a conflict data source. These summaries range from a complex and exhaustive review of Lebanon to a one-paragraph look at contentious relations between Bolivia, Chile and Peru.

The authors certainly deserve kudos, if for nothing else than for their effort to mention every possible combination of belligerents. Unfortunately, while their motives are laudable, their work seems plagued with value judgements and generalities which, although obviously tongue-in-cheek, often overshadow scholarship.

"The chief reason for the democratic success of the United States and Canada is that they sit on a big island. The Mexicans... aren't the Germans..."

If the reader can sort through all of the fact, fiction and value judgements and put all in their proper place, then the book can be valuable. The strength of this work is to be found in Part 6 which is, in essence, an exhaustive source of data related to both ongoing conflicts as well as potential ones. In this reader's opinion, this ". . . Data Bank," is worth the price-of-admission for those interested in a statistical look at conflict.

All things considered, "A Quick and Dirty Guide to War" is just what the title implies. As long as the reader understands the rules of the game, implied in the title, and is willing to draw personal conclusion, this easy-to-read book provides a single source of information from which to begin further research.

GORDON R. SULLIVAN
Brigadier General, USA
Ft. KNox, KY

PATTON: A HISTORY OF THE AMERICAN MAIN BATTLE TANK

, by R. P. Hunnicut. Presidio Press, Novato, CA. $55.00

This is an encyclopedic history of the *M48* and *M60* series tanks that have provided the bulk of U.S. Army tank strength for the last three decades.

This volume is largely a development history, beginning with the *M48/M60* antecedents in WW II and running through the current *M60A3* main battle tank.

Developmental versions, variants, specialist vehicles and paper projects are included as are some of the adaptations made by foreign owners.

Coverage of foreign versions, however, is relatively restricted, as is the operational history of the tank.

Numerous drawings, black and white photos, color plates, and tables illustrate this outstanding volume.

This is an exceptional work and well worth the attention of anyone interested in modern U.S. armor.

RICHARD BYRD
Captain, Armor
HHC, VII Corps

PRELUDE TO OVERLORD

, by Humphrey Wynn & Susan Young. Presidio Press, Novato, CA. 154 pages. $16.95.

This is an outstanding account of the air operations that preceded and supported *Overlord*, the Allied landings in Normandy on June 6, 1944.

This thoroughly researched volume tells the story of how Allied air forces carried out the directive from the combined U.S. and British Chiefs of staff to, ". . . produce air superiority, disrupt German military and industrial production and (effect) a decline in German morale, all of which are indispensable prerequisites to the successful military invasion of the continent."

Fourteen pages are given to the air commanders — American, British and German — with accounts of their backgrounds and, in some cases, the surprising differences of opinion they held as to how their missions were to be accomplished.

Included are many illustrations of the Allied aircraft used in the pre-invasion air strikes against the German Fortresss Europe.

HENRY G. GARDINER
Colonel, USA (Ret.)
Bozeman, MT

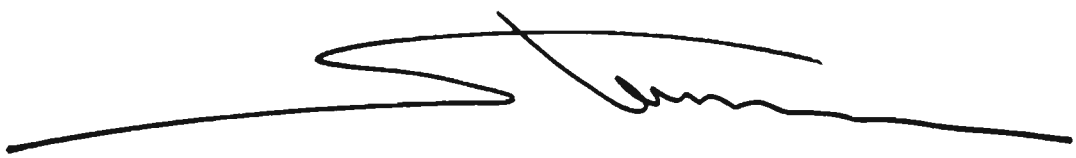
Few positions in the military offer opportunities for creativity, enhancement of knowledge, freedom, and the chance to see a complete product every couple of months as does that of editorship. Few positions offer the opportunity for private victory and public failure as does editorship. Countless readers peruse each issue. Many laud our efforts and many point out our failures. To all we pass on our gratitude for your interest.

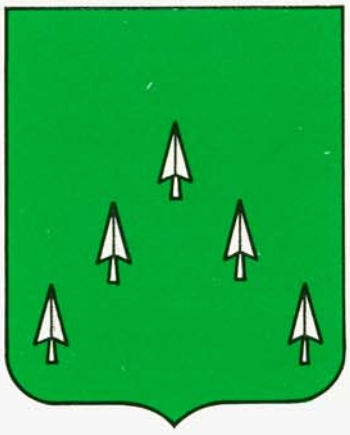
No professional journal survives without dedicated writers. Our writers come from the ranks of our readership and a more motivated group you'll not find anywhere. We are obviously grateful to those whose articles we published, but we are especially thankful to that much larger group of would-be authors whose articles we rejected. It was never a pleasant chore to say no.

Finally, special recognition should be made of the ARMOR Magazine staff. Though small, they are mighty for the information they impart world-wide.

ARMOR is a special magazine because of its heritage and continued quality. Don't take it for granted. Since 1888, it has weathered bad times and good, and the future promises no easier a time than in the past. Its contributions to our branch are immeasurable. Though intangible, they are nonetheless meaningful.

I'll soon be passing the baton to another to carry on a tradition of excellence. Support him as he labors to enhance professional writing and dialog in these pages. And, lest I forget — good shooting.





Symbolism

The shield is green with five gold spearheads representing a platoon of five tanks entering combat in a flying wedge formation.

The two lions refer to the arms of Normandy and of Belgium, where the unit served with distinction in World War II. The closed and bolted Korean gateway commemorates action in repulsing the enemy's attempt to pierce the Pusan Perimeter at Taegu in the Korean War.

Distinctive Insignia

The distinctive insignia is the shield and motto of the coat of arms.

70th Armor

Strike Swiftly

Lineage and Honors

Constituted 15 July 1940 in the Regular Army as 70th Tank Battalion and activated at Fort George G. Meade, Maryland. Inactivated 1 June 1946 in Germany. Activated 1 August 1946 at Fort Knox, Kentucky. Reorganized and redesignated 14 June 1948 as 70th Medium Tank Battalion. Reorganized and redesignated 31 December 1948 as 70th Heavy Tank Battalion.

Reorganized and redesignated 2 May 1950 as 70th Tank Battalion. Assigned 10 November 1951 to 1st Cavalry Division. Inactivated 15 October 1957 in Korea and relieved from assignment to 1st Cavalry Division.

Redesignated 25 January 1963 as 70th Armor, a parent regiment under the Combat Arms Regiment.

Campaign Participation Credit

World War II

- Algeria-French Morocco
- Sicily (with arrowhead)
- Normandy (with arrowhead)
- Northern France
- Rhineland
- Ardennes-Alsace
- Central Europe

Korean War

- UN defensive
- UN offensive
- CCF intervention
- First UN counteroffensive
- CCF spring offensive
- UN summer-fall offensive
- Second Korean winter

Decorations

Presidential Unit Citation (Army), Streamer embroidered COTENTIN PENINSULA (70th Tank Battalion cited; WD GO 85, 1944)

Presidential Unit Citation (Army), Streamer embroidered HURTGEN FOREST (Companies C and D, 70th Tank Battalion cited; WD GO 36, 1946)

Belgian Fourragere 1940 (70th Tank Battalion cited; DA GO 43, 1950)

Cited in the Order of the Day of the Belgian Army for action at ST VITH

Cited in the Order of the Day of the Belgian Army for action in the ARDENNES

Chryssoun Aristion Andrias (Bravery Gold Medal of Greece), Streamer embroidered KOREA (70th Tank Battalion cited; DA GO 2, 1956)

Republic of Korea Presidential Unit Citation, Streamer embroidered TAEGU (70th Tank Battalion cited; DA GO 55, 1954)