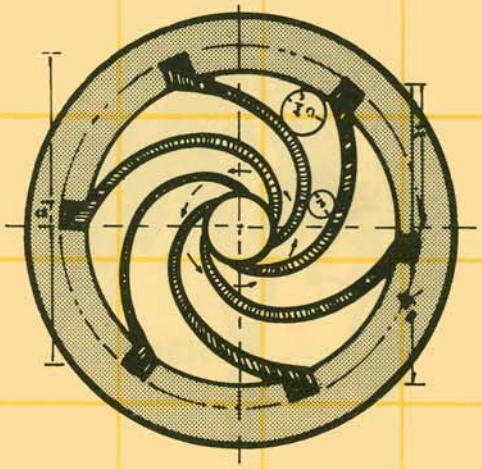
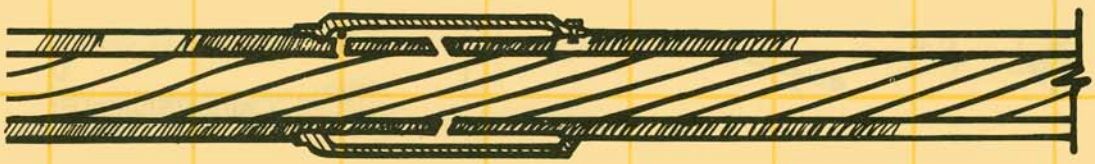
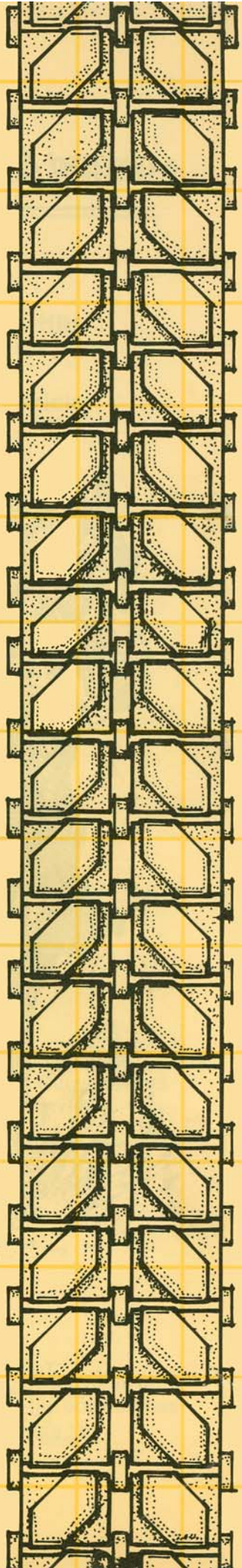
ARMOR

The Magazine of Mobile Warfare



Mark Kovacs '85





January - February 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

Will future tanks be turretless, or will users demand "room at the top"? Brigadier Richard M. Simpkin explores the possibilities and limitations inherent in new tank designs on page 18.

LETTERS

A Vet's Views on Division 86

Dear Sir,

I do not profess to know much about the new light and heavy divisions, but I won't let my ignorance prevent me from sharing some insights based on experience I gained in combat some 40 years ago.

There are four basic phases in combat, namely: attack with the aim of breaching the enemy's defenses and forcing him to retreat; pursuit of a retreating enemy with the aim of preventing him from establishing a new defensive front and hopefully cutting off his escape routes and destroying or capturing him; defense of a front; and if your front is breached, withdrawal with the aim of establishing a new front and avoiding destruction or capture.

I have been following the Division 1986 concept from its very early stages and have serious misgivings about its heavy division. I was concerned about its lack of dismounted infantry and thought that it would be hard-pressed to breach an enemy's front or defend a front against large masses of infiltrating infantry supported by armor and artillery. It's dependence on huge quantities of fuel and maintenance personnel makes it resemble a snake with an enormous tail that is vulnerable to guerilla attacks against its rear area.

The heavy division is good for the pursuit and withdrawal stages of combat before new fronts can coalesce. During the pursuit stages in WW II, armor, supported by infantry riding on tanks, excelled. Armor also fought well during the withdrawal stage of the Battle of the Bulge. However, when armor was used to attack a defensive line it did not fare quite so well. (British attacks in the Caen section, American attacks before the Roer River in the Ardennes).

I felt relieved when the new light division concept was formulated. Not because it is designed to be quickly moved to fight in potential Third World battle areas and not because I think that it is designed to be able to support itself in combat for an extended period. I do feel, though, that it complements the heavy division and when used in conjunction with it, a fighting team that can operate during all four phases of combat is available to an army commander.

The more changes in concepts that take place, the closer we get to the type of army that led to victory in WW II. We certainly have better equipment to fight with and to resupply our frontline troops than we had during WW II. But so does our potential enemy. We need to relearn the lessons of WW II and not base our future combat plans on untried tactics and concepts that can easily lose the next war for us before it starts.

We also have to reduce our reliance on shaped-charge munitions against tanks and develop more types of high and hyper-velocity guns that are cheaper to build, easier to maintain, conceal, and use, and are more effective in combat against the newly-developed armor and reactive armor.

We need more combat-ready units to enable us to deter or, if required, fight a conventional war. A foot soldier can be trained in only 13 weeks, but in order for him to function, he needs an already trained and equipped combat-ready unit that is fully staffed with its officer, NCO and specialist complement.

We and our allies can double the size of our light infantry assets if we elect to devote some of our resources to units that need only to have foot infantry reserves of recruits and draftees, who have finished their basic training, added to them. These units must be fully mobile in order to keep up with the fluid nature of modern warfare.

In conclusion, there are no short cuts to victory or stalemate in a conventional war and I do not believe that either we, our allies, or our major potential adversary, will resort to atomic warfare because almost everyone knows that once nuclear weapons are used by either side, there will be no victor, only the vanquished.

WALLACE J. KATZ
Jackson Heights, N.Y.

General Clarke's Guides Lauded

Dear Sir,

Once again, in the Professional Thoughts column of the September-October 1984 issue of ARMOR, General Bruce C. Clarke has provided us with another perfectly clear, very concise and thoroughly usable management tool.

General Clarke's advice on writing and speaking, unlike so many other guides to these subjects, is a perfect example of what it purports — it is brief, understandable, and tells us exactly what we want to know.

This one-page guide to communicating should be printed on the inside cover of the "Armor Briefing Guide," the "Staff Officer's Guide," and issued in wallet-sized format to every basic-course officer and NCO in the U.S. Army.

Bravo, General Clarke! And as a citizen and a soldier, I thank you for serving.

GERALD T. RANDKLEV
Major, Armor
Indiana Army NG

Motorcycle Research Goes On

Dear Sir,

I am gathering information for an article on the history and use of the WW II military motorcycle. I am doing this because of several articles and theses published in the past 10 years on the potential use of motorcycles in today's army.

While all these articles give a brief nod to the history of the WW II motorcycle, they all stop short of what actually was developed. Each article had stated that the army found the motorcycle unsuitable for military use and was footnoted to 1938-40 articles. It is further stated that a decision was made at that time to discontinue any further development or procurement. What has been left completely untouched is what transpired as to development, procurement and deployment in 1941 to 1945.

It is true that the motorcycle of 1940 was totally unsuitable for combat, but those machines were prototypes delivered by Harley-Davidson and Indian to locate trouble areas and deficiencies, which the Louisiana maneuvers and other testing quickly pointed out. The results led to a specific military machine for 1941, far superior to the 1940 model in each 'failure' area and the machines were designed for standardized equipment stowage.

Further field testing led to an improved model in 1942 which remained virtually unchanged throughout the war with the exception of minor changes.

The manufacturers also developed shaft-drive solos and attachable sidecars with power-driven wheels. These were developed as copies of the German BMWs and Zundapps. The Soviet Union also developed a copy and did deploy them in rifle troops. They still manufacture this unit virtually unchanged and even export it to the U.S., via England, under the name NEVAL. I don't know whether or not they still use it militarily.

There were many models developed by American manufacturers for our armed forces and those of our allies. It is interesting that Canada followed Lieutenant Fraser's recommendations more closely than our own services did. (See "Motorcycle Maintenance Problems," September-October 1940 Cavalry Journal). They arrived at a slightly more advantageous vehicle, the WLC made by Harley-Davidson.

It also is interesting that the armored forces were so satisfied with what was produced by Harley-Davidson in 1942 that they included 540 units in each armored division and opened a large training and mechanic's school at Fort Knox. The director of the motorcycle de-

partment was Lieutenant Colonel W.E. Watters.

Several other, smaller schools were spread across the country and run by the infantry, armor, or the quartermaster corps. They ranged from Fort Holabird, Md. to Fort Hood, Tx., and from Ft. Wayne, In. to Fort Riley, Ks. and others.

I am working on this article to show the history and track development of WW II military motorcycles, but there is a far more important reason and that is to reach those involved in the development of modern army usages of motorcycles, to let them know that development of the WW II motorcycle did not end with the failures of 1940, that far more was discovered shortly thereafter, to inspire them to study what was found (the methods used, the designs, the recommendations, the follow-ups, failures and successes), and to help them not to repeat mistakes already made.

There is so much available from that time that could help solve some of the problems now being encountered and would help prevent other problems from occuring.

BRUCE PALMER, III
P.O. Box 2063
Seffner, FL 33584

Second Class Soldiers?

Dear Sir,

The tradition of the Federal volunteer, including the National Guard, has always been a mainstay of our national defense and can be traced back to the birth of our nation.

Prior to WW I, formal training of reservists was non-existent, but due to the military manpower requirements of that war, the Reserve program moved into the 20th Century and, for the first time, civilians received intensive training before going into battle.

The need for intensive training today has become even more important than in the past.

Each year the Congress provides funds to the reserve forces to ensure that they are relatively up-to-date in equipment and training. The past two presidents took appropriate action to include improvements for the Reserves in defense planning, but even with the emphasis placed by them, many military men, both Regular and Reserve, are still dragging their feet.

Too many times the Reservist is treated as an unwanted stepchild when he reports to an Active unit for his active duty training. In many instances Reservists are given "busy" work to do; the perception being that since they are parttime soldiers, they do not have the knowledge nor the ability to perform as fulltime soldiers.

Unfortunately, you will find uneducated and poorly-trained soldiers in all branches of the armed forces — and in their Reserve components. It is the duty of commanders to either weed these people out, or train them to standards.

The lethality of modern weapon systems has been proven again and again in recent years and the ability to survive and win are dependent upon a highly trained, modern and integrated fighting force.

Because of the time-distance compression brought about by modern communications and transportation facilities, there must be cohesion between and within all branches of the military forces if a nation is to survive.

Where do the forces come from to fill the vacant units and individual positions of the frontline Regular units in a modern war? Do we have the time to build up a trained force, as in the past? Probably not!

The Regulars, augmented by the reserves, must be able to handle the initial combat missions, while fill-in and follow-on forces must be available in a relatively short time. The "Total Force" concept is a must, and integrated training between Active and Reserve individuals and units is mandatory in order to ensure a readily available fighting force.

Such training must also actively involve Reservists in mobilization-related training.

The perception that Reservists are parttime, non-professional, or second-class soldiers, must be eliminated. Reservists must be given the opportunity to participate in mobilization-related training, not given "busy" projects to fill in their time.

The "Total Force Concept" was described as the "central feature of our National Security Strategy" by the Secretary of Defense in 1970. Only through realistic training will the cohesiveness be built between Active and Reserve forces. Only a well-trained, integrated fighting force will be able to meet the demands of the modern battlefield.

HUGH O. BALE
Major, USAR
Maryland Heights, MO

St. Vith's Lessons

Dear Sir,

Captain Stephen Borows' article, "Armor's Stand at St. Vith" in the November-December 1984 issue of *ARMOR* Magazine is an excellent treatise of one of the crucial battles of the Ardennes campaign. He did an excellent job of assessing many of our errors which contributed greatly to the German offensive.

"A Time For Trumpets" by Charles MacDonald is an excellent book dealing with the Ardennes campaign and his analysis of our many tactical errors corroborate Captain Borows' comments.

I have read many books on the Ardennes campaign and I feel that it has more implications for our armed forces than any other battle in WW II.

Pearl Harbor is usually brought to our attention when unpreparedness is cited, yet our mistakes in the Ardennes were inexcusable because we were overconfident, which led to poor planning and execution of battle plans and operations.

The tenacity of our men against overwhelming odds is an example for all Americans, and we should never forget their sacrifices.

The lesson to be applied today is that we must be prepared twenty-four hours a day with the best weapons systems and the trained personnel to operate those systems. We will not have the 'luxury' of weeks, months or years to replace men and equipment as we did in WW II. We cannot allow the Soviets to continue to develop new and more numerous weapons systems than we possess and we must encourage our legislators to provide adequate funding for national defense.

The high quality of *ARMOR* Magazine is very much appreciated.

WILBUR CLINE
Kettering, Ohio

A Leopard Without Its Spots.

An ID error was made in the Nov-Dec Recognition Quiz answers. The *Leopard 1A3* is in reality, a *Leopard II* prototype with a 120-mm main gun. Our apologies to our sharp-eyed readers. Ed.

Autoloaders

Dear Sir,

I read Captain O'Connell's article, "The Automatic Loader Gap," in the November-December 1984 issue of *ARMOR* Magazine with great interest. I agree, in principle, that a functioning autoloader could be a great boon to the fighting capabilities of our armored force. As he points out, it would lessen wear and tear on the loader, reduce the chances of human error, and provide greater crew protection.

However, I take exception to the notion that installation of autoloaders would allow the elimination of the fourth crewman.

My primary objection to eliminating the human loader is the most obvious: breakdown of the mechanical autoloader. Every piece of equipment will break down at some time or another and if you eliminate the human loader, you will be in trouble when your autoloader quits working.

In any event, a four-man crew is more efficient than a three-man crew. A four-man crew will allow the gunner and the TC to remain at their stations. If the loader is removed, the TC would become responsible for observation in all directions, save for the restricted fields of view of the gunner and driver. If the loader is gone, so is his machinegun position,

reducing the vehicle's close-in firepower. The TC would also have to become the air guard. All the shared crew work on the vehicle would have to be done by three men instead of four, leaving all men with less time for rest and other functions.

Contrary to Captain O'Connell's views, it has been my experience as a cavalry platoon leader that a three-man crew tires much more quickly than a four-man crew.

The autoloader idea is a good one. However, until they design one that can man an OP, break track, cut camouflage, and brew a good cup of coffee, I'll keep the fourth man in my crew.

STEVE J. EDEN
First Lieutenant, Armor
Ft. Stewart, GA

"Old Soldiers Never Die"

Dear Sir,

There is an old Army song that goes, "Old soldiers never die, they just fade away." And that is true; old soldiers simply fade into the memories of their surviving comrades; they never really die.

One such old soldier was Major General Arthur L. West, Jr., who recently faded away and was buried with full military honors in Arlington National Cemetery. His memory will never die among those who knew and served with him.

I had the distinct honor to confer a battlefield promotion to the grade of lieutenant colonel on then-Major West during the Battle of France in 1944. At that time he commanded the 10th Armored Infantry and later was awarded the DSC by General Patton.

Colonel West served under me when I was assistant commandant of the Armor School at Fort Knox and later on my staff in I Corps in Korea. Later he served as commanding general of the 3d Armored Division.

During the fighting in France, my combat command in the 4th Armored Division often consisted of the 37th Tank Battalion, commanded by Colonel Abrams, and the 10th Armored Infantry under Colonel West. Along with armored field artillery and armored engineers and logistic support units, that team could always be depended upon to carry out any assigned mission. They were largely responsible for my military reputation and they earned a promotion for me.

Such men could never be forgotten.

BRUCE C. CLARKE
General, USA (Ret)
McLean, VA

Late Word

Occasionally, letters get mis-filed, and that's apparently what happened to one from reader Donald J. Loughlin, who wrote to ARMOR in July, 1983, to correct the fact that we'd misidentified an M46 tank as an M47. Loughlin's letter also included some interesting background and personal impressions of the M26-M46-M-47 tank series, which we reprint here:

. . . The *M26* had the WWII Ford liquid-cooled engine used in the late *M4* tank series, a Torqmatic transmission, and a controlled differential for steering, while the *M46* was the first postwar tank to go to the Continental air-cooled engine and the cross-drive transmission., Recognition features . . . are:

The small compensating idler between the rear road wheel and the drive sprocket. In the *M26*, the sprocket is closer to the road wheel and there is no room nor the need for the compensating idler. Other recognition points are the fender-mounted mufflers just aft of the fender box seen over the three middle return rollers.

At first glance, the bore evacuator and the single muzzle brake might identify it as an M46 (rather than an *M26*), but some late-model *M26s* did receive the *M3A1* gun and were identified as *M26A1s*. . .

. . . the *M47* tank is essentially the turret from the experimental *T42* medium tank placed on the chassis of the *M46A1, with the chassis receiving slight modifications (three return rollers versus five on the M46*). The 90-mm gun on the *M47* fired the same basic family of ammunition as the *M26-46* tanks, and the coaxial MG mount could accept either a .50 or .30-caliber machinegun.

The *M47* was hurriedly placed into production during the Korean War, the Army being subjected at the time to a lot of criticism about the performance of its *M24s* and *M4s* against the Soviet *T34/76* and *T34/85* tanks used by the North Koreans. The *M47* was really placed into production too soon, and there were a lot of teething problems with its all-electric turret and turret drive. Furthermore, its stereoscopic rangefinder was difficult to learn to use. (It was very simple for me: once I realized that all one had to do was to forget about looking at the "geese" and just adopt a "thousand-yard stare" looking at the horizon. Unfortunately, a couple of years had lapsed in the meantime.)

It is unfortunate that the *M47* (the turret, at least) earned a reputation for unreliability because it did have some good points that could have been resolved had it ever received the *long* period of product improvement benefitting the *M48/M60* series.

Some of the good points of the *M47* were:

Its *M46/M46A1* chassis was a mature design, except for the disturbing tendency of the *M46* series to lose final drives, which could be a little distressing on mountain roads. This was solved, as well as it could ever be, on the *M48*, and could have been on the *M47*.

Its stereoscopic rangefinder provided binocular-stereo vision which the coincidence rangefinder does not, and gathers more light as well. Learning to use the stereoscope rangefinder may not be as difficult as has been claimed.

Probably the best point of the *M47* was that it was the last of its kind of turret, whereas the commander's role was not made into that of an auxiliary gunner. In the *M47*, the gunner operated the rangefinder, not the commander, and furthermore, there was no commander's machinegun cupola to increase his vulnerability, to restrict his vision, and to further distract him with a device that carried an inadequate ammunition supply *if* the gun was working. The early *M48s* (Phase III and Phase IV fire control) as I remember, kept the stereoscopic rangefinder in order to increase theoretical ranging accuracy. In order to do so, the longer rangefinder had to be moved further back, where the turret was wider, so that the prism end boxes wouldn't stick out so far. Thus, the rangefinder ended at the tank commander's position — a dubious tradeoff at best.

My concern over this point may seem overdone to the generations of tank commanders who have never experienced anything else, but a tank commander shouldn't be an auxiliary gunner. He should be free to command the vehicle, and to do this, he must maintain contact with the battlefield and needs excellent all-around vision, aided as necessary with optical and other devices intended for a *commander.*

I will get off my soapbox now and say, "Three cheers for the *M47*!" It deserved better than it got.

DONALD J. LOUGHLIN
San Ramon, CA

Centennial Issue

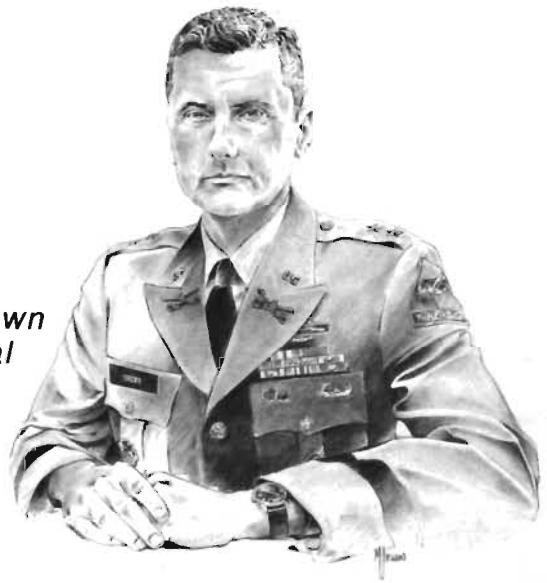
To commemorate this year's Armor Association Centennial, the May-June issue of Armor Magazine will be a special issue, featuring stories from past pages of ARMOR and its predecessors, The Cavalry Journal and the Armored Cavalry Journal.

The issue will feature the writings of many of the famous authors who have, with their words, changed minds and changed history, among them: Chaffee, Patton, Clarke, Pershing, Abrams, Ulmer, Starry. . .

All new subscribers whose orders are received before May 1 will be included in the mailing of this special issue. Additional subscription information is on page 1, next to the table of contents.

A sidebar story on the St. Vith battle, which appeared in the last issue of ARMOR, misspelled the name of General Matthew Ridgway.

COMMANDER'S HATCH



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

Fighting to Win

The Combined Arms Maneuver Battle

We are fortunate to have a superb leader and teacher as our assistant commandant. I commend to your reading the following thoughts of Brigadier General Gordon R. Sullivan, delivered in a speech to incoming AOB classes.

The focus of our efforts in the armor force is combined arms mobile warfare, and we are committed to winning that war.

Mobile warfare — a battle of maneuver, firepower, and movement — is an inevitable American doctrine in a tactical and operational sense. While this may well be a traditional American way of fighting, this doctrine is not automatically translated from the classroom to the battlefield. The transition is made by leaders committed to leading their combat soldiers to victory. They are leaders who understand that there are three maneuver arms — armor, infantry, and aviation — and appreciate the doctrinal and leadership realities associated with synchronizing these three maneuver arms with other arms and services into a total force committed to winning.

A few months ago one of the Armor School action officers attended a meeting to discuss leadership training in the TRADOC service schools.

Surprisingly enough, at least to me, the discussions became somewhat heated over the focus of leadership instruction. That is: should the instruction be combat leadership oriented, or leadership/management oriented? As it was reported to me, the group voted for what was agreed upon as a more 'neutral' approach to leadership training — in other words, not combat-related leadership. I am happy to report that this suggestion was not accepted and, in fact, there is no doubt in TRADOC that our army is committed to training to lead in combat.

Neutral in relation to leadership is not the adjective which we think of when we look at the professional soldier of any branch. Rather, we see in him or her a person committed to protecting a way of life and it makes no difference what the officer wears for brass.

The simple facts of the matter are that all of us are committed to leading men and women who have *voluntarily taken an oath to defend their country.* There is no room for neutrality on this matter. Our most important and significant task is to train our people to respond effectively when called upon to do so, in moments of searing emotion, terror, stress and death.

When George Washington crossed the Delaware with a handful of Colonial soldiers, he set the standard for all of us who have followed. He eliminated the neutrality option for American fighting men and women.

We are one hundred percent committed to deterring war. If it becomes necessary to fight, — we expect to win. We study the art of war and the science of war, not to promote it, but to preserve peace.

Our first task then, is to deter war. We, as military officers, believe that through the fielding of tough, well-trained, well-equipped soldiers, sailors, air crews and marines, that our enemies will recognize that peace with freedom is our goal. We think that proud units equipped with *Abrams, Bradleys, Apaches,* etc., will demonstrate to the world that we embody the spirit of our predecessors and are a manifestation of the credo set forth by General Patton:

"I am an American soldier.
I fight where I am told.
I win where I fight."

We are as committed today to winning through mobile combined arms warfare as we were in 1940 when General Chaffee and a select group of cavalry, infantry, artillery and ordnance officers created the Armored Force. We are as committed to the goal of mobility and flexibility in body and spirit as all great battle captains have been since recorded history provided us with our first insights into organized warfare.

Our doctrine today is AirLand Battle. It means, in its broadest terms, that we will fight a battle of maneuver, firepower, and movement; combined arms warfare; in coopera-

tion with our sister services and allies. It emphasizes tactical flexibility and speed as well as mission orders, initiative, and the spirit of the offensive. Our ultimate goal is to destroy our enemy on *our* terms.

We must be flexible in mind and body so that we will know when and how to use our total strength effectively to win.

The finest tools and the best troops in the hands of a fool avail nothing. You will lead the finest soldiers a nation can yield. Your equipment is good. Now it is up to you.

Our military history is replete with examples of great soldiers being led by less than competent leaders. I am sure that those leaders knew that the immutable of combat is that you must establish an effective base of fire so that you can move both units and fires to wrest the initiative away from your enemy. But did they do it? *Base of fire — move,* is true from combat involving a fire team to an army. The secret is knowing when to fire and when to move and being able to synchronize your unit so that you achieve weight over your enemy. The secret is having the courage to plan your fight and fight your plan.

This does not mean that you slavishly stick to some preconceived notion of your fight. Rather, it is to urge you to conceive a plan, explain it to your people, and then put your plan into execution based upon the realities of the battlefield moment.

The key is knowing when to move, or strike.

While many may argue that this is *art,* I am prepared to argue that if you know what it is that you want to happen, and convey this to your people in clear, concise, terms which real fighters and leaders can both understand and execute in moments of stress, that you will know when to move. You will know because you and your men will have been in charge from the outset. The enemy will have been yours from the beginning.

General McClellan at Antietam kept a cavalry division in reserve for two days, then finally placed it in the center of the line where it served little purpose — simply because he couldn't decide what to do. He issued fuzzy orders, had no clear concept, and failed where he could have succeeded.

General Hooker at Chancellorsville kept a force of 11,000 mounted troopers in reserve virtually the entire five days of the engagement because he lost his courage. Even though he had Lee out of his fortifications and into the field where the Union wanted the Army of Northern Virginia, Hooker simply surrendered the initiative to Lee and he did not regain it, although he could have.

Just because we are armor officers, cavalry officers, mechanized infantrymen, aviators, or the national descendants of our great battle captains, does not mean we are ready to face the challenges of today's fight — we will not be up to the challenge simply because we are combat arms officers.

You must use all the tools at your disposal effectively on your piece of the battlefield. Ultimately, you and I will be judged by how well we and the people we have trained and brought along fight. It will be a sad day in our lives if you leave part of your total team out of the fight when you should have committed it. Victory may well be yours but, unless I miss my guess, at twice the cost.

The battlefield of interest to us will be the one found within the boundaries of the combined arms heavy brigade. The fact that our focus is the heavy brigade does not mean that there will not be regular, or light, or airmobile infantrymen fighting alongside the mounted soldiers. Indeed, this is becoming more and more possible with each day.

Our goal is to develop the minds and spirits or our officers to be flexible, tolerant, intuitive, as well as disciplined and logical — to use all of the assets at their disposal to take the initiative away from the enemy. It makes little difference if you have a mixed force, or frankly what makes up your force. What makes the difference is that you are capable of imaginatively capitalizing on the design characteristics of your force. What separates the great from the not so great is that the great, the Philip Sheridans of the U.S. Army, recognize that sometimes modifications are necessary to win. Sheridan recognized that cavalrymen were often more effective when fighting dismounted and other times the reverse was true. Sheridan maximized his cavalry resources. He was not burdened by preconceived notions. He knew what his mission was — victory, and he *fought* accordingly.

Our challenge is to develop the mental skills to recognize these balances.

I echo the words of General Richardson and point out that we are as dedicated today as our predecessors to developing a military mind — in the positive sense. A mind steeped in the methods, procedures, and fundamentals of the profession, but bold, original, and creative; a mind that is technically competent and technologically current, yet sensitive to the variable and incalculable human factors in war; a mind that understands the uses of knowledge and intelligence, the importance of fitness, and the power of good character. It must be a mind tempered by systematic training, broadened by progressive education. . . in short, it must be a mind that rigorously and continuously pursues mastery of the art and science of war.

We will not win the next war unless we are confident we will win. As General Donn Starry put it, in one of his Commander's Hatch articles when he was commandant of the Armor School (see July-August 1975 issue of ARMOR. Ed.) "The clear lesson of war is that in the end, the outcome of battle depends on the excellence of training, the quality of leadership, and the courage of soldiers. It is quite clear that the side that thinks it will win usually does. . ."

We develop this confidence through training, education and practice. Knowing that we are good and have some of the best equipment in the world is only part of the equation. Knowledge must be translated into effective combat units and your challenge is to make this transition from theory to practice.

It is up to you to marry each of your men with their equipment and with their comrades in an effective and enduring fashion, so that we in fact will demonstrate such compelling military competence that our potential enemies will decide that it is best to solve problems peacefully.

But if it is necessary to fight, we will accommodate battlefield requirements for change quicker than they and will, through the application of tried and true combinations of maneuver, firepower, and movement achieve victory.

We must have the courage and mental ability to know when and where to maneuver against our adversaries. Our soldiers will follow us into the white hot center of the fire if they know that we are prepared to share their hardships and if they have confidence in our ability to defeat our enemy.

The American fighting man has never failed.

The key ingredient in all of this is *you.*

To quote John Stuart Mill:

"War is an ugly thing, but not the ugliest thing. The decayed and degraded state of moral and patriotic feeling which thinks that nothing is worth war is much worse. A man who has nothing for which he is willing to fight, nothing he cares about more than his own personal safety, is a miserable creature who has no chance of being free, unless made and kept so by the exertions of better men than himself."

DRIVER'S SEAT

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

Fighting the System

There are a number of assignments and schools that are beneficial to every soldier's career. Some of us know what they are, some of us think we know what they are, and there are some that could care less what they are. In any case, we, as members of the Noncommissioned Officer Corps, have many more special assignments and educational programs (NCOES) available than ever before. However, many of us are constant fighters of the system and go all out to be removed from those programs.

I would like to use this opportunity to discuss some recent incidents that have occurred that directly relate to "fighting the system" by the NCO and the chain of command.

A sergeant first class attending the Drill Sergeant School was becoming a motivational problem to everyone. He did not want to be a drill sergeant and could not understand why he was in school. After counseling the sergeant, the following problems were identified:

- He had told his chain of command that he did not want to be a drill sergeant and his chain of command tried to get him released, but was unsuccessful.
- He had only three years remaining in the service and being a drill sergeant was not his idea of soldiering, since he was retiring.
- He did not feel he should have to work with trainees as an SFC.

The sergeant is now doing well in school after a few choice words at the end of the counseling session. However, there are three distinct problems identified that need to be addressed because the abuse of our assignment system has a dramatic effect on our Army.

Each of us as a noncommissioned officer can expect to be selected as a recruiter, drill sergeant, ROTC instructor, or other special assignment during our career. Generally, the selection for a special assignment indicates that the sergeant selected is a *top quality NCO,* one who will perform well over a three-year period without supervision or a major loss of knowledge in his job skills.

Notice, I wrote "selected." That means that no one asked you — they are telling you. When we reenlisted in the Army we volunteered to do what our supervisors told us to do.

Don't fight it!

We could have dropped the sergeant for motivational reasons and placed an adverse academic report in his permanent records to be seen by every promotion board or selection board that screens NCO records. Additionally, a letter could have been sent through the chain of command to his commander identifying the motivation problem, possibly causing judicial or nonjudicial punishment.

The chain of command must be positive in every way when it comes to the assignment of personnel. Trying to get a soldier out of assignment not only hinders the assignment system, but also compromises the integrity of the chain of command. We need to do what is best for the Army and the soldier concerned — Even if it means losing the best NCO we have. As NCOs, we have to understand that special assignments outside of our MOS can be very rewarding and positive for our career.

As noncommissioned officers, it is our responsibility to train soldiers regardless of how long they have been in the Army. Training trainees is a tough assignment. However, it is a very rewarding assignment. It is tough because the type of soldiers you are working with require repetitive training — the same repetitive training we noncommissioned officers required when we were trainees.

Training is rewarding for many reasons: Seeing a person grow to the standards of a soldier because of your teaching has got to be satisfying. To have his parents tell you that they are proud of him at the completion of training, and knowing you are responsible, is very rewarding. Seeing that same soldier a couple of years after graduation as a mature soldier makes it even more gratifying and rewarding. It makes you proud that you are part of the system and not the problem.

In my travels I still meet a large number of noncommissioned officers who have not attended a noncommissioned officer course and don't understand the implications of what happens to them if they continue to evade the system. They

have bragged to me on how they got their supervisors to defer or delete them from ANCOC due to operational needs.

Every noncommissioned officer of the armor force will attend the Advanced Noncommissioned Officer Course, Armor, either through the DA selection system or through being selected for promotion to E-7. To be selected for ANCOC you must be competitive with your peers. The last E-7 board after-action report contained many laudatory remarks about armor noncommissioned officers. However, one comment that was not complimentary was the absence of attendance at PLDC, BNCOC, or ANCOC.

There are two attitudes that exist. The first is that many NCOs believe that when they get promoted they no longer need to attend school. I have talked to a lot of SFCs that commented that they no longer have to attend ANCOC because they were promoted to SFC.

The second attitude lies in the chain of command's inability to get the right NCO into school. Removing NCOs from attendance at schools because of deletions or — as in some cases, outright misleading counseling — is detrimental to that NCO's career.

In both areas, special assignments and NCOES, the same attitudes exist where problems are found. The corrections to the problem can be very simple.

As an NCO, you should strive to attend each level of the Noncommissioned Officer Education System if you plan on making the Army a career. As an NCO, you should expect to serve a tour as a recruiter, drill sergeant, instructor, etc. As you prepare to meet the challenges of both environments, your goals should be aimed at being the best. With a positive attitude upon entering the program, your success will be most noteworthy.

The chain of command must support the Army and the NCO. There are certain responsibilities every noncommissioned officer has. The NCOs know that the chain of command demands that they be knowledgeable in order to carry out those responsibilities. At the same time, the NCO looks to the chain of command for guidance and assistance in those areas in which he has no control. The chain of command must understand the reason why their *best* scout section sergeant or platoon sergeant was selected for a special assignment. He was selected because his records indicate he is one of the best the Army has to offer. If this is true, support it to the hilt. If it is false, then document and process the paperwork so the NCO is never selected for another special assignment.

Attendance at NCOES is as important to the noncommissioned officers as AOAC and CG&S is to the officers. When it is time for the best NCO to go to a school, his officers' and senior NCO's support must be present. Yes, the NCO might miss a gunnery qualification, an ARTEP, or an FTX, but in the long run the Army and its soldiers gain much more by having a better-trained soldier to lead them.

All of us need to work together to eliminate a growing attitude that does not reflect the *best* for a professional force.

1985 Armor Conference

Proposed Agenda

Monday, 6 May	0900-2200	Registration (Officer's Club)
Tuesday, 7 May	0700-0800	Late Registration (Gaffey Hall Library)
	0800-1100	Opening Remarks Presentations: Combined Arms Winning: Armor, Infantry, Aviation, Artillery.
	1100-1145	Armor Association General Membership Meeting
	1145-1300	Executive Council Armor Association Luncheon
	1300-1500	Assessments: Tank-Infantry Team; Armor Support to Light Forces; Cavalry
	1500-1700	Demonstrations/Displays
	1700-1800	Centennial Retreat Ceremony
	1800-1930	Chief of Armor Garden Party
Wednesday, 8 May	0900-1000	Keynote Address CofS, Army
	1000-1200	Presentations Training to Win - NTC Training to Win - 7 ATC Training to Win - NG Div
	1200-1300	Lunch
	1300-1500	Presentations: Key Issues in Training, Manning, Developing, Supporting
	1500-1800	Demonstrations/Displays
	1900-2200	Armor Association Banquet
Thursday, 9 May	0800-1100	Panels: Training, Manning, Developing, Supporting
	1100-1300	Chief of Armor Luncheon
	1300-1430	Panel Reports
	1430-1500	Closing Remarks

MASTER GUNNER'S CORNER

A Link to Gunners in the Field

Since 1977, the Master Gunner Branch, Weapons Department, U.S. Army Armor School, Fort Knox, Ky. has had a point-of-contact program designed to provide a continuous link between master gunners in the field and the Armor School. In September 1977, this program was expanded to include liaison with each Army Readiness Region (see *ARMOR* Magazine, January-February 1978 for details.) During the years between the establishment of this program and the present, this vital link has been maintained informally by master gunners and has proven to be an effective method of sharing information and training techniques.

The development of viable tank gunnery training programs must incorporate careful consideration of numerous local conditions such as the current training posture, resource availability, and the short-and long-term objectives of the training programs. As such, the planning and implementation of tank gunnery training precludes the use of a universally applied 'school solution.' In view of this situation, the master gunner is specifically trained to develop workable, realistic gunnery programs tailored to local conditions. His mission is to assist the commander in establishing and/or maintaining a continually sound gunnery training program. The Master Gunner Branch remains ready to support the master gunner in the field as he drives towards the accomplishment of this mission.

Instructors in the Master Gunner Branch are assigned the responsibility for maintaining communications with, and providing training assistance to, units in the field. Listed are the names of the primary and alternate points of contact for each Readiness Region and major unit or post. These individuals can be reached via Autovon 464-8530, or by writing to Headquarters, U.S. Army Armor School (ATTN: ATZK-WP-MG) Fort Knox, Ky.

USA

Location	Primary	Alternate
Ft. Knox	SFC Russell	SFC Patterson
Ft. Hood	SFC Spurling	SFC Drake
Ft. Bliss	SFC Rucker	SFC McDonald
Ft. Riley	SFC Hartsell	SSG Vann
Ft. Lewis	SSG Graves	SFC Coxey
Ft. Bragg	SFC Patterson	SFC Kuamoo
Ft. Carson	SFC Heim	SSG Kennedy
Ft. Polk	SFC Harmon	SFC Dale
Ft. Benning	SFC Dale	SFC Barker
Ft. Sill	SFC Kirklin	SFC Hartsell
Ft. Stewart	SFC Kirklin	SFC Hartsell
Hawaii	SFC Kuamoo	SFC Manley
US Marine Corps	G Y S G T Isherwood	SFC Drake

Readiness Regions

Region	Primary	Alternate
I	SFC Bland	SFC Drake
II	SFC Patterson	SFC Dean
III	G Y S G T Isherwood	SSG Kennedy
IV	SFC Spurling	SFC Kirklin
V	SSG Vann	SFC Coxey
VI	SFC Russell	SFC Patterson
VII	SFC McDonald	SFC Spurling
VIII	SFC Heim	SFC Gooch
IX	SSG Graves	SFC Manley

Overseas

Unit	Primary	Alternate
8th ID	SFC Patterson	SSG Graves
3d AD	SFC Harmon	SFC McDonald
1st AD	SFC Kirklin	SFC Gooch
3d ID	SFC Russell	SFC Spurling
2d ACR	SFC Dale	SSG Vann
11th ACR	SFC Bland	SFC Dean
Berlin BDE	SFC Kuamoo	SFC Spurling
1st ID (FWD)	SFC Hartsell	SSG Kennedy
7th ATC	SFC Bland	SFC Heim
2d AD (FWD)	SFC Drake	SFC Russell
2d ID Korea	SFC McDonald	SSG Kennedy
Lahr, W. Ger.	WO Wonderham	SFC Manley
England	WO2 Chaplin	SFC Manley

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)

Barrel Distortion and First-Round Hits

by Lieutenant Colonel David Eshel (IDF, Ret.)

Modern battle tanks are expected to have the capability of knocking out an enemy tank within a few seconds of its acquisition.

While there are several means to combat adversary tanks, be it advanced technology "smart" munitioned artillery, air-to-ground attack, or third-generation antitank guided missiles fired from ground-mobile or air-launched platforms, it is an established fact that the tanks' most deadly enemy was, and still is today, a well-trained, skilled tank gunner, using his main armament, fire control system and a wise choice of ammunition, working in good coordination with the tank commander and loader.

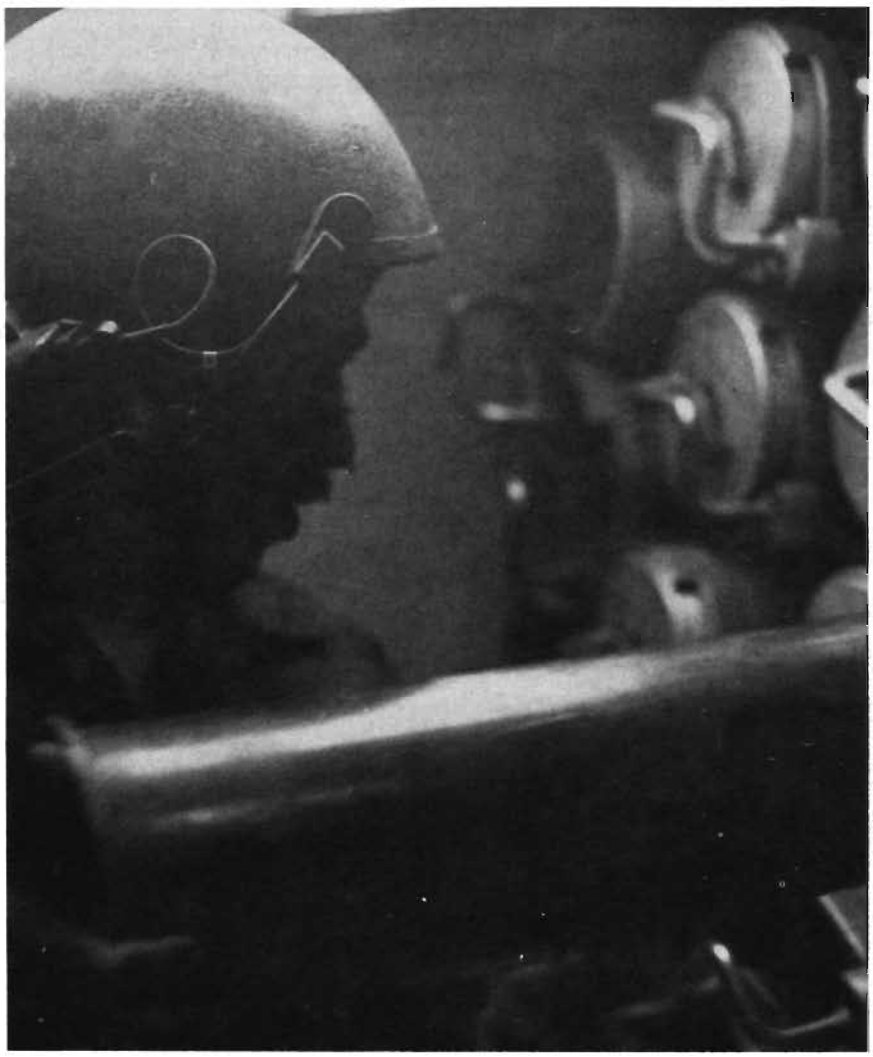
However, to achieve first-hit probability within acceptable parameters and at a high rate of firing sequence, several aspects — some of which are well know, others partially or completely ignored — have to be taken into consideration, or adequately solved.

High-hit probability is of special importance when a negative numerical ratio is encountered in combat. This will certainly be the case in a Warsaw Pact-NATO confrontation, and in circumstances prevailing in the Middle East. To redress this inequality in numbers, high technology solutions, such as sophisticated weapon systems, weapon mix integration and realistic training schedules have been developed. These are aimed to open the engagement at maximum range, using a combination of high-hit probability with lethal terminal effect to reduce numerical superiority of an advancing enemy until he closes in for the kill at shorter range, where flat trajectory firing will cause high attrition.

In order to understand the problems of long range gunnery techniques, a glimpse into ballistic theories is required, as these have a crucial bearing on the behavior of the round from its firing to its arrival on target.

Ballistic Considerations

Ballistics theory is one of the most difficult fields of technology, involving critical measurements, but in order to simplify the matter, we shall discuss in short three aspects having immediate influence on our problem. They are: internal ballistics, external ballistics and, terminal ballistics.



Internal Ballistics. This concerns the phenomenon of the firing process which leads to the movement of the round inside the gun barrel until it leaves at the muzzle.

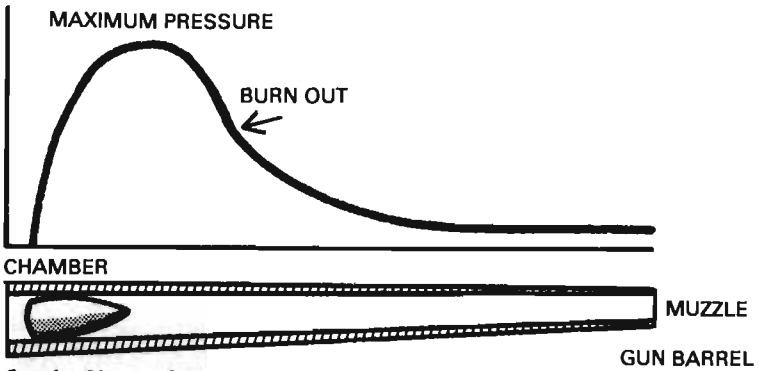
External Ballistics. This deals with the behavior of the round from the time it leaves the muzzle along its flight path until it reaches its final point.

Terminal Ballistics. This applies to the hit and penetration sequence once the round hits its target, disintegrates on impact or comes to final rest.

As the subject is obviously far beyond the scope of this short article, we shall touch only on a few aspects necessary for our examination.

To achieve high-hit penetration and lethal effect, the armor-piercing round has to be propelled at a flat trajectory for maximum range — the result of high muzzle velocity. This is made possible by the high pressure created by burning explosive propellants inside the gun chamber.

As the pressure reaches its climax, the round is moved along the barrel towards the muzzle. The speed at which the round leaves the barrel is called the muzzle velocity. There are various ways to increase this speed — usually by reducing the caliber of the projectile. The higher the speed by which the round is propelled, the flatter will be its trajectory over a measured distance, until the law of gravity will cause it to fall to earth. Theoretically, then, given a certain muzzle velocity, a known-weight projectile, fixed at zero aiming point, should hit its assigned



Graph of internal pressure during firing.

An exaggerated view of barrel elasticity during firing.

An exaggerated view of barrel bend during firing.

TANK GUN FIRING

Typical Internal Ballistics

Drawings exaggerate the various factors in barrel distortion.

target located within a certain distance. This method, known as *combat range* shooting — where the gunner simply places his aiming sight cross-hair on target and fires, was once common practice, and still is under certain conditions. Unfortunately, modern combat requirements are more stringent and, therefore, need elaborate systems to achieve the necessary results.

While modern fire control systems, involving advanced technologies for range measuring, sensoring of climatic environments, gun and ammunition parameters and other intricate aspects of the firing process, are extremely well designed, even the most sophisticated system will leave room for error —both human and systematic —frequently resulting in non-hits of the first, second, and even third round fired. Some of these errors are usually accepted as within normal gunnery standards, based on average results in training.

However, on a closer examination of some of the lesser known fields of ballistics, a much higher gunnery standard can be envisaged if viable solutions are adopted to overcome these problems.

Barrel Distortion

Returning momentarily to the subject of internal ballistics, a well known but underestimated phenomenon — the behavior of the gun barrel during firing —comes immediately to mind.

The gun barrel is never absolutely straight. The bending of the barrel comes from several factors: —a downward bend normally results from its specific weight (an average modern tank gun protrudes some 5 meters and weighs several tons). Bending sideways is due to climatic influence on the gun barrel, such as lateral wind cooling, rain, sleet or snow on one side of the barrel.

Although these deviations are minimal and extremely difficult to measure, they nevertheless have a crucial effect on the first-hit capability of the fired round.

Active solutions involving advanced sensoring of wind variables, temperature, and barometric pressure, fed into integrated computer systems, only partly solve the acute problems presented by barrel distortion.

Further complications are added by the internal process taking place inside the barrel during the firing sequence.

As the round is propelled forward under great pressure, the gun barrel widens elastically with the advancing projectile, causing the barrel to bend (similar to the behavior of a rubber hose as water passes through it). Once the round moves forward, the pressure subsides and the barrel returns to its normal state, but this causes it to bend again. The bending is circumferential and depends on the ammunition used. For example, a 105-mm APDS round causes the barrel to bend upwards, while HEAT rounds of the same caliber bend the barrel downwards. Again, rifled and smoothbore gun barrels vary in their bending behavior.

To overcome barrel distortion in the field, various means have been developed. One of these is a visual/optical combination — the Muzzle Reference System (MRS) — providing a means whereby the gunner can align his sight with the axis of the muzzle. Originally working with a passive mirror system, a more advanced active device uses a long-duration light source integrated into the gunner's optics and the central FCS computer.

The MRS is an expensive device, and it is also vulnerable to enemy fire under combat conditions. Furthermore, the MRS only partially compensates for barrel bend variables. A less expensive solution which provides better results is the thermal jacket or sleeve, which has become standard equipment on most modern MBTs and has been effectively combat-proven by the IDF in Lebanon.

Although the thermal sleeves have been adopted by most armies for quite a while, the importance of this factor on high first-hit probability has somehow been ignored, with more potential accredited to the active fire control system's influence. The thermal sleeve, being a passive means, is nevertheless a dominant factor in the achievement of first-hit probability and it can reduce error considerably.

Precision Measurements

One of the reasons for ignorance is due to the lack of understanding of the highly sensitive parameters of gun distortion — either from environmental or ballistic phenomena — which can be

calculated only through ultra-precision measurements with sophisticated highly professional means. Furthermore, there remains a substantial difference between theoretical tests made on laboratory criteria and actual firing tests with precision measurement supervision —an extremely costly and time-consuming business, which can only be ironed out by well-trained teams integrating sophisticated know-how.

Such tests have provided valuable patterns of how gun barrel behavior operates under different environments. The results proved that the measurement parameters are extremely delicate and difficult to achieve under normal conditions. The deviations, however, have a crucial bearing on a first-hit probability and, if ignored, can cause considerable error in firing, which cannot be compensated by even the most sophisticated fire control systems.

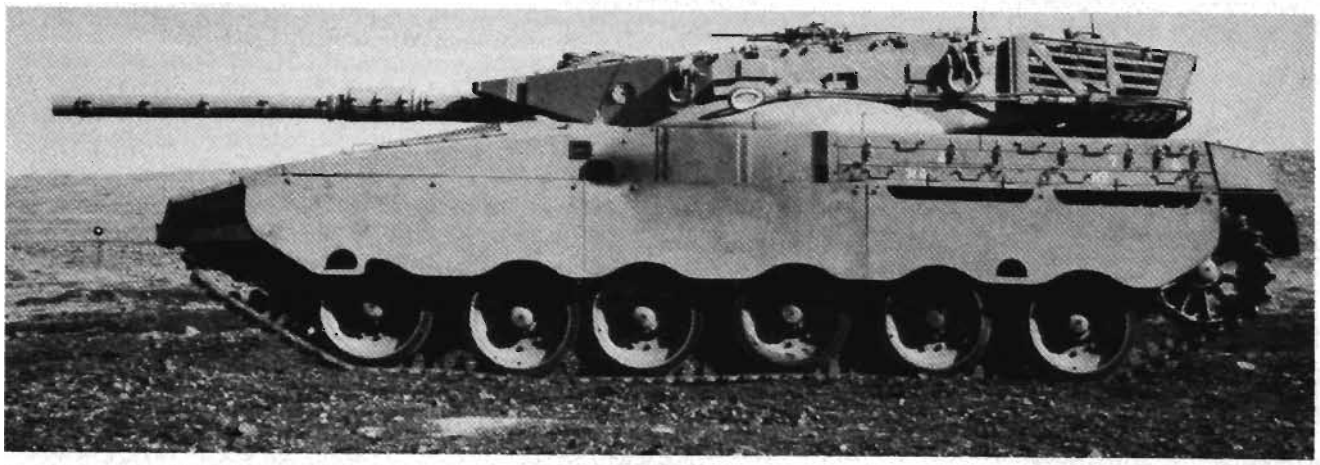
Precision measurements made on live-firing tests have shown that there is a variation in temperature changes along the gun barrel between 80°C - 130°C, depending on the number of rounds fired, while circumferential temperature changes remain constant.

Temperature variations are extremely small and reach some 3.5° under normal conditions, which makes it very difficult to measure under laboratory test simulating live fire.

Outside firing tests have indicated maximum barrel distortion at 1000 hours in the morning and 1600 hours on bright sunny days, although it was thought that solar radiation would influence the barrel vertically at noontime. However, the reverse radiation from the heated ground had an almost precise countereffect, rebalancing the barrel. Such precision measurements are almost impossible to achieve under laboratory tests.

Although such elaborate measurements may seem somewhat exaggerated to the layman gunner, it has nevertheless been proved beyond doubt that errors up to one mil have been made due to external causes affecting the barrel on a normal bright day. If, during firing, rain beats down on the barrel, errors over 7 mil have been recorded. The obvious results would be complete misses on target, even though all other parameters might be perfectly observed within the normal firing sequence.

Styles in thermal sleeves vary, with British, above, wrapping their gun tubes in a sort of tarpaulin jacket, while U.S. tanks like the M60, right, and Soviet T-72, below, use rigid insulating sleeves held on by metal bands. A snug fit is essential for accuracy, the author says.



Israeli gunners greatly value thermal sleeves, seen here on Merkava.

An effective thermal sleeve can reduce this error to 0.25 mil.

Normally, the barrel warms up on firing the first round and starts compensatory distortion — reaching an optimal close to zero after the tenth round. The maximal error of 20 cm at 1,000 meters would apply — in contrast to about one meter error with the first round fired. Even under optimal conditions, however, errors cannot be completely ruled out. Other aspects such as the barrel jump, as the round leaves the muzzle, are difficult to measure and compensate, as jumps differ in elevation and deflection, with variable effect.

The Thermal Sleeve

Known modern thermal sleeves are manufactured from plastic or metal insulation material, and cover the barrel with a closely fitting protective cylinder tube. These are common in German, French and Soviet tank guns. The British method adopts a differrent concept, using a loosely fitting tarpaulin jacket. All thermal sleeves or jackets are designed to insulate the barrel from outside environmental effects. If the sleeve does not fit closely to the barrel, the remaining air space acts as an air trap which causes temperature changes with hot air rising upward —resulting in distortion. The plastic insulation is insufficient, as it leaves about 70 percent of the bend. Thermal sleeves, using methods by which the heat is conducted around the metal sheath, reducing barrel bend to a mere 30 percent, contribute considerably to first-hit probability.

One major factor in the efficiency of the thermal sleeve is elimination of water collecting inside. Water condensation can cause severe changes in temperature and become a serious cause of error.

Another problem is presented by the sleeve sliding directionally with the movement of the round. When fired, the round is propelled by over 500Gs, a tremendous force which causes the thermal sleeve to slide forward. Although modern sleeves use tight-fitting bands and clamps, these may not be sufficient to withstand the force, and they may break under strain. Therefore, special arrangements have to be made to keep the sleeve tight over the barrel.

Conclusion

Integrated fire control systems have become the most effective means to improve the performance of any battle tank and achieve high-hit probability under combat conditions.

The probability of achieving a hit on another tank depends on a variety of factors, which include range, type of ammunition and its condition, gun jump, barrel wear, parallax error (difference between reference points in the optics), barrel distortion, as well as turret cant angle, and environmental effects, such as ambient temperature, cross winds, rain, and air density (atmospheric pressure). We shall examine the influence of this factor in a subsequent article, as it is of great interest in long-range gunnery, in which the projectile, propelled at hypersonic speeds, is extrememly vulnerable to aerodynamic pressures encountered under conditions similar to those in high-speed flight.

The little-known effects of barrel distortion have been examined in this article, familiarizing the reader with passive solutions to an acute problem with crucial effects on precision gunnery.

There is no doubt that an effective thermal sleeve can contribute cost-effective solutions towards achieving high-hit probability under combat conditions.

Israeli tank gunners, a very hard-to-convince lot, have adopted thermal sleeves as a must — to the extent that, in combat, damaged thermal sleeves were repaired by the crews in the field, using tape to close ruptured sections.

While the thermal sleeve is of a passive nature, it blends well into the active and highly sophisticated technologies of the integrated fire control system. In reducing barrel distortion, an effective thermal sleeve can become a crucial factor in achieving first-hit probability.

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LIEUTENANT COLONEL DAVID ESHEL, now retired from the Israeli Defense Forces, was a founding member of the IDF Armor Corps in 1948 and served for 26 years in various staff and combat assignments. A graduate of the French Armor School at Saumur and a former lecturer at the IDF Command and Staff College, he is now editor of Defence Update International. Among his book credits is the recently published "U.S. Rapid Deployment Forces."

Panhard's New Light Armored Vehicle

by Richard M. Ogorkiewicz

Ever since the development of armored forces, there has been a need for light wheeled vehicles to actively support the armored force and to act in a variety of auxiliary roles.

As early as 1928 the British Army tried to fulfill these requirements by using stripped-down versions of the contemporary Austin passenger cars during the trials of its Pioneer Experimental Mechanized Force.

During WW II, the idea of a light, wheeled vehicle for scouting, liaison and similar roles was taken up in the U.S. and developed into the highly successful Jeep. Since then Jeep-type vehicles have been adopted throughout the world and their widespread use shows how much they were needed.

However, for all their usefulness, Jeeps and their various derivatives, or successors, have been deficient in one very important respect — they were not armored. This made them vulnerable on the battlefield to rifle fire and in internal security missions to accurately thrown stones. As a result, Jeep-type vehicles are not as effective in many circumstances as a light, wheeled armored vehicle.

How effective light, wheeled armored vehicles can be was first demonstrated by the British Army during WW II with the *Daimler Scout Car.* This small, two-man vehicle was armored all around but weighed only 2.8 metric tonnes (6,174 lbs) and proved very effective in a variety of reconnaissance and liaison roles.

Since the 1950's, the *Daimler Scout Car* has been replaced by a similar, but improved, vehicle called the *Ferret.* This has been widely used by the British Army in many different situations, from the fighting in what is now South Yemen, to patrolling more recently in Beirut as part of the Multi-National Peace-Keeping Force.

However, successful prototype vehicles are always modified which increases their weight and leads to even heavier follow-on types. For instance, the original Willys Jeep had a curb weight of 2,203 lbs, but its present day successor, the *M998 HMMWV,* weighs 5,100 lbs. Similarly, the 4.2-ton *Ferret* has been followed by the 6.12-ton *Fox.* The latter is much more heavily armed with a 30-mm *Rarden* cannon, but it no longer enjoys the advantages of small size and light weight of its predecessors and is not suitable for many of the roles which they fulfilled.

The M11's low weight, 6,285 pounds unloaded and 7,807 pounds combat loaded, can be easily lifted by a variety of helicopters and fixed-wing aircraft. Panhard foresees development of a broad family of 24 versions of this basic vehicle.

But the concept of the very light, wheeled armored vehicle has proven too successful to be abandoned. Thus, although the British failed to continue its development, the French Army has

The M11's militarized Peugeot diesel, developing 105 horsepower, gives the vehicle a top road speed of 60 MPH. Above, the prototype demonstrates its high-speed cross-country performance. At right, the M11 is shown with an armament package that includes the Milan antitank missile and 7.62-mm machine-gun.

now taken it up. As a result, the Panhard Company designed a very light, wheeled armored vehicle which is not only new but represents a major advance over other vehicles of its type.

Early Panhard Designs

What Panhard have achieved with their new light vehicle is not surprising in view of their record of successful development of wheeled armored vehicles. In fact, Panhard have the world's longest record in the development of such vehicles. Recently, they produced the 8-wheeled *EBR* armored car which was designed soon after WW II and is still one of the most remarkable wheeled vehicles to be produced. It is only now being retired from service in the French cavalry regiments.

Since 1960, Panhard had produced the 4-wheeled *AML*, (see November-December 1967 *ARMOR*). The *AML* has been used not only by the French Army, but by several others, due largely to its combination of light weight and effective armament.

The *AML 90* version is armed with a 90-mm gun, although its weight is only 5.5 tonnes (12,128 lb). This gave it more gunpower in relation to its weight than any other armored vehicle and it set a worldwide trend in the use of 90-mm low-pressure guns in light armored vehicles.

During the past few years, Panhard have produced yet another outstanding design, the *ERC-90 S*, (See November-December 1981 *ARMOR*). This 6-wheeled vehicle is also armed with a 90-mm gun, but of a much more powerful type than that mounted in the *AML*. As a result, it can fire not only fin-stabilized HEAT rounds but also APFSDS rounds with a muzzle velocity of 1,300 m/s (4,264 f/s). Yet the *ERC-90 S* weighs only 7.65 tonnes (16,868 lb). This is remarkably light in relation to its firepower and makes it the obvious choice for the French Army's equivalent of the U.S. Rapid Development Force.

Panhard ULTRAV

In addition to procuring the *ERC-90*, the French Army foresaw in 1977 the need for a much lighter wheeled armored vehicle, to which it gave the generic designation *VBL*, *Vehicule Blinde Leger* (light armored vehicle). This vehicle was capable of a wide range of missions but in particular of reconnaissance and of antitank combat with guided missiles.

In response to this requirement, Panhard developed their new Ultra-Light Armored Vehicle, or *ULTRAV-M11*, that not only meets the requirements of the French Army, but also a much wider need for a versatile light armored vehicle.

The basic design of the *M11* is straightforward and eminently sound. it has an integral all-steel armored body with the engine at the front, an essential characteristic for a multi-purpose vehicle as it leaves the rear of the body clear for the installation of different weapons systems or to carry troops. Aft of the engine compartment is the driver's station with another crew seat beside it. The arrangement of the rear of the body depends upon the mission. In combat configuration, the rear is occu-

The M11's low ground pressure of 11 lbs. per square inch enables it to move over soft ground with ease. Reduction gears at each wheel have the effect of increasing ground clearance without adding additional height to the vehicle.

pied by a gunner or missile operator and ammunition. When used as a personnel carrier, the rear provides space for up to four men.

Exceptionally good access is provided by a rear door and two side doors. In addition, there are three circular roof hatches with those above the second crew member seat and above the rear of the body being used as weapon mounts.

Euromissile Milan

The most powerful armament carried by the *M11* is the Euromissile *Milan* antitank guided missile system. The missile launcher is mounted over the rear of the body and six extra missiles are carried inside. In addition to this missile system, the *M11* carries a 7.62-mm machinegun, mounted over the second crew member's seat and 3,000 rounds of ammunition.

The Franco-German *Milan* missile has a range of 2,000 meters and is not only the standard antitank guided weapon of the French and German infantry, but also of the British and several other European armies.

An improved *Milan* has been produced with a larger shaped-charge warhead that can penetrate 1,060-mm of steel at optimum stand-off distance.

Armed with the *Milan*, the *M11* constitutes a very potent and highly mobile antitank weapon system which can be effectively employed in delaying or covering force operations in support of major combat elements or by itself.

Light Weight and Mobility

The high mobility of the *M11* comes from the combination of its light weight and automotive characteristics. Its combat-loaded weight is 3.54 metric tonnes, or 7,807 lbs. Empty, it weighs 2.85 tonnes, or 6,284 lbs., not much more than the basic, unarmored version of the *M998 HMMWV*.

The *M11's* light weight enables it to be air transported in relatively small cargo aircraft and to be air-lifted by more than one type of helicopter.

The *M11* has a top road speed of 60 mph and a range of 470 miles. It is amphibious and swims at 3.6 mph. Water crossing preparation takes no more than two minutes, including the erection of a transparent plastic bow vane.

Its power-to-weight ratio is 30 hp per metric tonne (or 27 hp per U.S. short ton). The engine is a militarized version of the 105-hp Peugeot car diesel engine and the German-made ZF transmission is also a standard, well-proven commercial product.

The drive from the power unit is taken fore and aft to the four wheels which have step-down reduction gears to increase the ground clearance. All wheels are independently sprung and have disc brakes. Tires are 9.00 x 16 Michelin "run-flat" types which give a ground pressure of 11 lb/in^2 (lower than the nominal ground pressure of several battle tanks) which obviously assists the *M11* in off-road operations.

Armor Protection

The *M11* is fully armored and protects against 7.62-mm ball and armor-piercing ammunition. The hull is built up of high-hardness steel armor plates welded into a single unit. This is superior, weight-wise, to conventional rolled homogeneous steel armor as well as to aluminum alloy armor.

The *M11* stands only 67 inches high (5' 7") and is fitted with two large front windows and a window in each of the three doors. The bullet-proof glass provides the same level of protection as does the armor plating.

The good vision provided by the large front windows enables the driver to drive fast and safely. His vision is not limited to vision blocks or periscopes.

This requirement for good driver vision was observed several years ago in the U.S. trials of the *XM808 Twister* armored reconnaissance vehicle, which also provided large front windows.

The large windows on the *M11* also serve it well in other than combat situations. For instance, in the internal security role, the crew can observe all that is going on around their vehicle in perfect safety.

There are, in fact, a large number of roles for which the *M11* is suitable, or to which it can be adapted. Its developers claim that they can see 24 different versions of the basic vehicle.

In one form or another, the *M11* is likely to be widely used in the future.

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Room at the Top

by Brigadier (Ret.) Richard M. Simpkin

When I had the privilege of visiting Fort Knox last spring, I put this question to Major General Frederic Brown, Commandant, U.S. Army Armor School: "Will our successors fight the next main battle tank by electronics, or by the seat of their pants?" His answer was characteristically incisive, thoughtful, and precise: "They'll fight it electronically at the halt, but by the seat of their pants on the move."

A year back, a meeting of *LEOPARD 2* and *M1* users at Munsterlager, West Germany, insisted that the commander should normally fight the tank head-out "to sense the battlefield." Yet, with one small highly predictable step forward, optronics will allow the designer to offer the user a crew-in-hull tank with these advantages:

- Swimming with an on-board screen.
- A saving in weight of around one third, say to MLC 40, with all the combat and logistic advantages that implies.
- Much improved hit avoidance thanks to agility, low silhouette, and, in particular, a reduction by a factor of fifty or so of the area exposed in hull defilade.
- Good direct protection, with much improved resistance to side and overhead attack.

It is in this last point that the crunch lies. The threat to the main battle tank (MBT) from the tank gun and the surface-launched cruise missile is yielding pride of place to two new threats. The helicopter attack over a wide horizontal arc and, from its chain gun, with a significant angle of descent. Then there is the whole spectrum of overhead attack, exemplified by COPPERHEAD, GAMP and MERLIN, smart submunitions with self-forging fragment (SFF) and shaped-charge warheads, and doubtless before long, short-range terminally-guided ballistic missiles. By the time the next tank comes along, the concept of a narrow, shallow frontal arc, on which a conventional tank depends for its protection against dedicated attack, will be as dead as the dodo.

In this article I want to highlight one or two key points and outline the intermediate paths along which user and designer might stroll hand in hand. To achieve this in the space available, I will be brief and sweeping, relying for credibility on fuller discussions of Cliff Bradley's and my own in your columns and elsewhere.

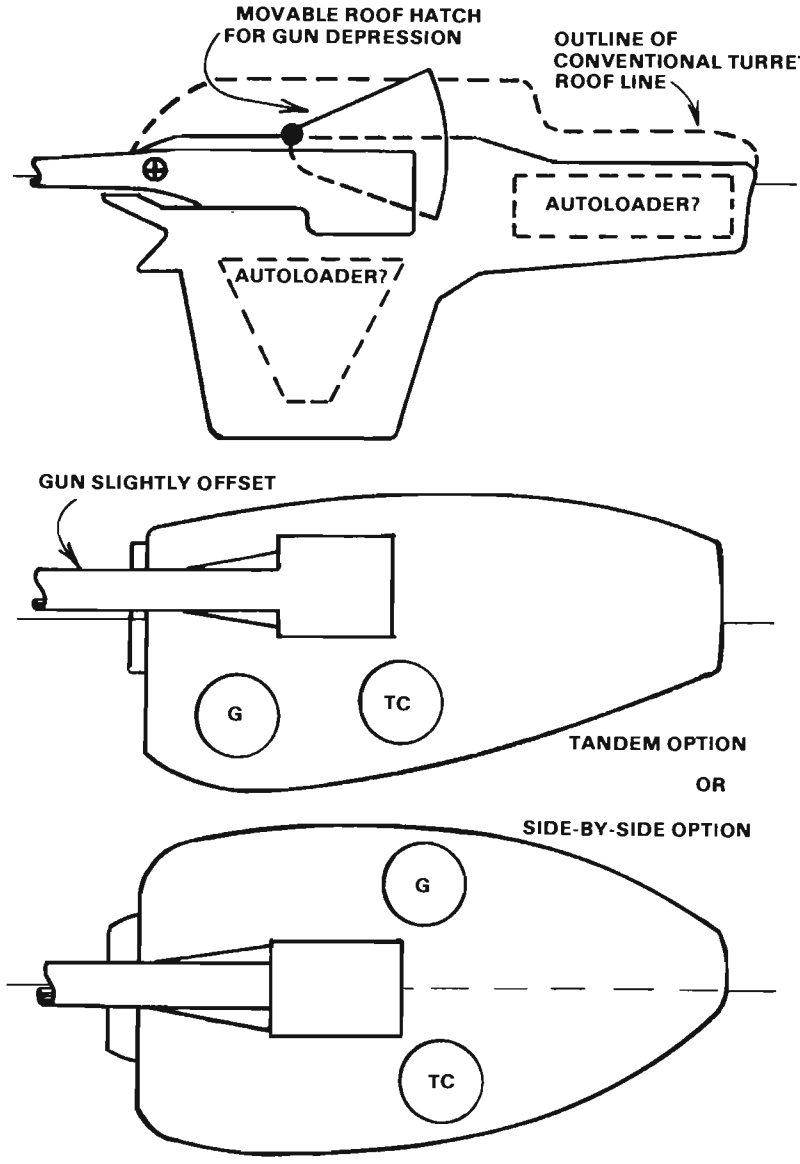


Figure 1a.

Luckily, we have wooden if not yet metal realizations of the two extremes — the conventional in the low profile turret of *LEOPARD 3* (figure 1a), and the far-out in the Swedish *UDES 40* (figure 1b). Very briefly, *LEOPARD 3* will have an autoloader (either a turret-basket carousel or a bustle system); a roof hatch to take care of the breech end of the gun in depression; and the commander and gunner up top, possibly in tandem alongside a slightly offset gun.

UDES 40 (the "40" being the weight ceiling) will have a crew of three in the hull; a yoke-mounted external gun (in fact, the German 120-mm smoothbore); a primary vision surveillance/sighting system (VSSS) just above trunnion level; an external system

". . . One sees tank commanders exposed down to the waist, already halfway to Heaven. . ."

Fig 1b. (Above) Model of the Swedish UDES-40 shows crew-in-hull layout with yoke-mounted external 120-mm gun, fed by external magazines at the rear of the hull.

Fig 1a. (left) The Leopard 3 concept is more conventional, with commander "up top" in low-profile turret. Several possible autoloader configurations are shown. A roof hatch rises to accomodate the gun breech in depression.

capable of reloading the gun in any attitude from external magazines on the hull rear; and integrated compound armor making use of the engine compartment, the contents of the sponsons (including fuel in both cases), and the umbrella effect of the external mounting.

Laser Blinding

There are suggestions that laser blinding may impose the use of indirect (optronic) VSSSs, thus nullifying the advantage of having the commander up top. Laser blinding is certainly a two-edged weapon; and the enthusiasm by which it has been hailed by some leads me to suspect that it may turn out to be, figuratively as well as literally, a flash in the pan. In any event, improved forms of the techniques once proposed for optical VSSSs against nuclear flash blinding may well provide an answer.

Commander's All-Around Vision

I go right along with General Brown and the work on slit vision going on at Fort Knox. I never was able to control a tank closed down — let alone a platoon, a company or a battalion combat team. I have had the privilege of knowing a few American, British and German senior noncoms who could; but they were all superb professionals, of trials crew/senior schools staff standard. The four British ones who spring to mind all finished up as lieutenant colonels! By contrast, no army could withstand the attrition rate tank commanders with their heads out were always apt to suffer, and are almost certain to suffer under today's and tomorrow's indirect fire.

I am extremely familiar with the course of American and British cupola development through the '50s and '60s; I am reasonably aware of what has gone on in those countries since; and I have a nodding acquaintance with the Zeiss PERI R 17 commander's sight of *LEOPARD 2*, a superb device of its kind.

With standoff and hindsight, I believe both those approaches were and are wrong. While the Germans and the Soviets had always had a liking for rotating-head periscopes, your designers and ours struggled with fixed periscopes and vision blocks to give the commander uninterrupted, all-around, parallax-free vision. This was not enough, because "enough" information — the theoretically necessary amount — is not enough to give the human brain job satisfaction. The brain requires enough *surplus* information to be able to evaluate and consciously reject some. No way is the tank commander going to be happy with the amount of inputs he can get from a cupola or a rotating-head periscope — so he sticks his head out and gets himself shot.

One needs to take a realistic look at just what all this conventional top-hamper will keep out, and the answer is — not much. Even with the kind of thickening that might be feasible, a fair hit by a dedicated attack is going to pass through the roof (probably blowing in or off any cupola or hatch), most likely through a crew member, and more likely still into an autoloader carousel placed down below like a stop-butt. So one wants to think about protecting the commander from the scatter and deflection effects of dedicated attack, and from the non-dedicated attack still delivered by the great majority of battlefield weapon systems. This could probably be achieved by an "armored" glass or plastic dome large enough to allow the commander to move his head freely and to use handheld binoculars, rear vision being provided by racing-type mirrors in armored fairings. The washing and wiping of a dome is not an insoluble problem. The dome could be designed to be replaced from inside, thus providing an emergency exit; but a separate hatch, presumably rear-facing, would be needed for normal access. A lift-and-turn or lift-and-flip-over steel lid of the type now used to provide slit vision would protect the dome fully or partly when required.

If commanders find domes like this too restrictive, another option is a two-man "armored" transparent hood for the commander and gunner. If they were located in tandem, this would closely resemble the cockpit hood on training gliders and old-fashioned aircraft (the kind with propellors); so one would expect it to be acceptable. The idea of a transparent dome or hood needs to be explored in depth; it could well offer a cheap, light and highly-acceptable solution. The only problem then remaining would be how to leave the commander's field of view uncluttered by the primary instrument heads; in recent American, British, German and Soviet photographs, one sees tank commanders exposed down to the waist — already half way to Heaven and just waiting for the first splinter to complete their journey for them.

Gun and Ammunition—Inside or Out?

Having taken a great leap forward in survivability with the externally-vented

"The problem with both these nacelle layouts is they look wrong. . ."

bustle bins of *M1*, the U.S. user has no intention of letting his main armament ammunition get any closer again. As long as the ammunition is wholly or partly shielded by the turret or mounting, and can blast off or be jettisoned clear to the rear without risk of molten, burning propellant entering the tank, its location is not too critical. One need only to add that the Swedes have done their homework on mounting ready magazines and decided firmly against them. Briefly, they increase the area of the hull defilade target, cause stabilization problems when partly empty, and are apt to leave the commander with the wrong kind of round "up."

User reaction to putting the gun outside is another thing. On the vulnerability to overhead attack of the parts normally inside the turret, my guesstimate is that, if the breech and firing connections are shrouded against non-dedicated attack and secondary effects, the small presented area, the curvature of the exposed surfaces, and the thickness of metal involved make the risk minimal. Shifting the swept overhead volume of the gun outside the armored envelope is the major weight-saver in a crew-in-hull design.

Two-Up Configurations

Low profile turret. (Leopard 3, figure 1a). The low-profile turret represents a major advance in the face of horizontal attack, whether frontal or flank, because it reduces the height above trunnions (to turret roof), and thus the presented area, by one third or more. The proportionate reduction of the area exposed in hull defilade is evidentally much higher. But because the length and angle of the turret side is unchanged, this configuration has little to contribute to the level of protection against flank attack. Much more important, it does nothing at all against overhead attack. The turret roof is just as flat, if anything larger, and significantly weakened by the gun hatch. (In fact, I strongly suspect this turret was designed against the classical threat analysis.) The spread-eagling of the crew right under the roof considerably reduces real survivability, the more so if they are sitting on the main armament ammunition! Putting the turret crew in tandem and offsetting the gun slightly could slightly reduce roof area, but I suspect the "other half" of the turret

The Cleft Turret

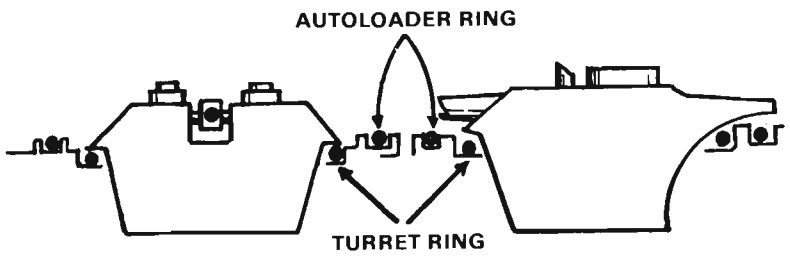
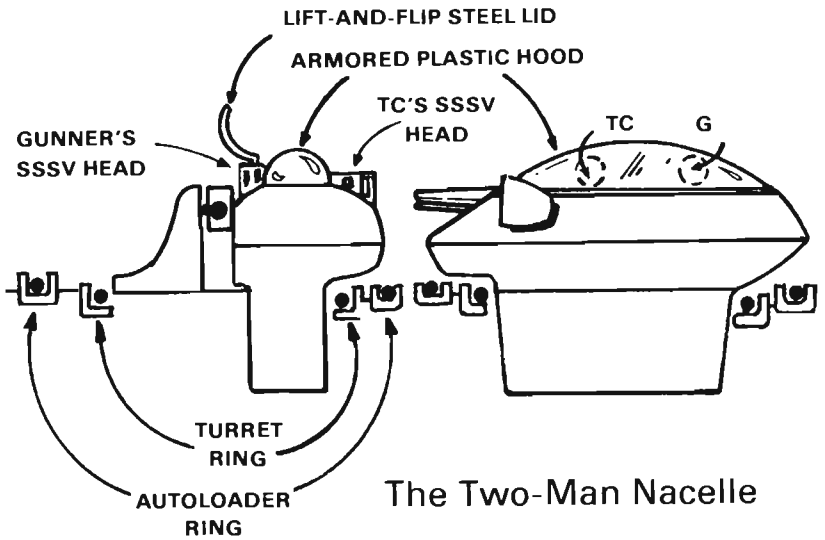


Figure 2a.



The Two-Man Nacelle

Figure 2b.

Cleft turret layout seen in Fig. 2a, above, has some advantages but the cleft presents an effective shot trap not easily overcome. The two-man nacelle, Fig. 2b, resembles tandem aircraft cockpit layouts, offering good visibility with plastic dome.

above ring level is needed for electronic and power packs. Any weight saving is probably taken up in thickening the turret roof and sides — or certainly ought to be. I would assess this as a useful if conservative product improvement to *LEOPARD 2,* which might have application for *M1,* but no way as an occasion for celebrating the birth of a new half-generation.

Cleft turret: (figure 2a). The need to reduce the area of the turret roof and increase its level of protection is as important as to make the cleft turret rear its ugly head once more. This is a step in the right direction in that it allows the turret crew to be placed in nacelle-like pods which can be shaped to optimize protection. It also lends itself to external autoloading from safely remote magazines (see *UDES 40,* figure 1a). But is still suffers from the ladies' cocktail party problem — What happens when somebody drops something down the divide? Unless one expends an absurd amount of weight

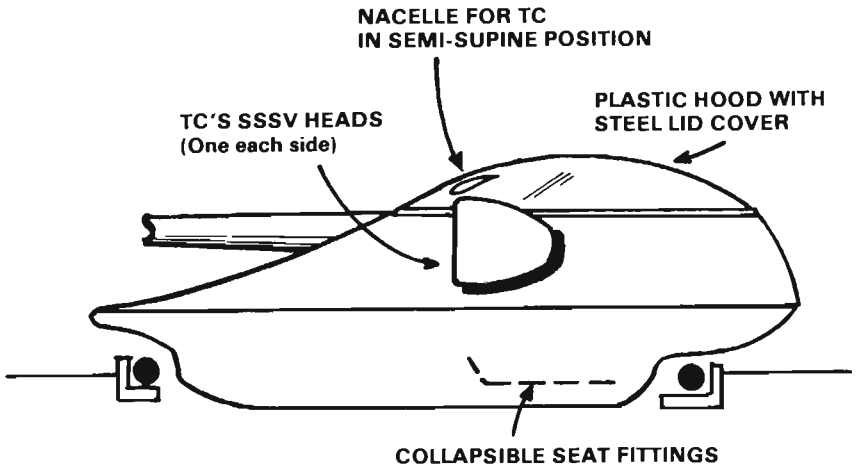


Figure 3.

armoring the inward-facing surfaces, even a conventional 81-mm mortar bomb or 105-mm shell, nicely tamped by the walls of the cleft, is going to wreak havoc.

Two-Man Nacelle: (figure 2b). If one takes the overhead threat seriously, a two-man nacelle looks attractive. It is a classical aircraft configuration and therefore likely to have high user acceptability. It can be shaped to present some very interesting compound angles to attack from most directions, including above. Space permitting, it could be bulged to accommodate compact armor arrays. Given careful design, there need be no serious HE pockets. The turret crew can touch each other and converse without aids in the standby state. The plastic hood could be side-hinged, and protected by a steel lift-and-flipover lid hinged in the same place as the hood. Instrument heads could be accomodated in the sloping sides and front, clear of the commander's natural field of view. The questions are: how far one could offset the gun to get a roomy nacelle within a compact and streamlined silhouette; and whether the out-of-balance torque of the nacelles would be acceptable in a stabilized system. I do not have recent enough data on turret races or powered mounting gears even to ballpark these. But with an external gun, one can reduce the trunnion reaction, and hence the slew couple for a given offset, by around 75 percent — 50 percent by muzzle braking (as in *UDES 20*), and 50 percent of the residue by doubling the recoil length. So there may well be a technically acceptable arrangement.

One-Up Configuration

(Figure 3). The only interesting-looking "one-up" layout comprises a central (i.e., not offset) gun on an external yoke mounting, with one side of the yoke expanded into a nacelle for the commander, and the gunner either underneath the gun (as in *UDES 20,* figure 4, and probably *UDES 40*), or below hull-roof level on either side (rather as in the compact *M60A2*).

Since the gunner traverses with the gun, he can have an optical surveillance and sight head, together with any other sensor heads, at the same level as the commander. The periscope tube and other links could be run up inside the gunner's half of the yoke, together with the elevation drive for the gun and, if required, drives for the VSSS. This would allow commander and gunner to split the surveillance task, as now. There is unlikely to be enough space to give the commander a rest position in the hull; but he could probably touch and converse with at least one other crew member, and could be evacuated into the hull by collapsing his seat. Otherwise, most of the arguments deployed for the two-man nacelle apply here too.

One has now gone far enough from the conventional tank to achieve considerable weight saving and reduction of target area in hull defilade. The only tangible drawbacks are the loss of a second pair of eyes physically up top, and limitation of contact between commander and gunner. The problem about both these nacelle layouts is that they look wrong; but the ugliness may well be in the prejudiced eye of this beholder.

Pop-Up Configuration

Pop-Up Commander: In *UDES XX 20* (figure 4), the commander, whose station is in the hull forward and right of the mounting, can pop up in a cylindrical armored sheath to bring his eyes to (or just above) trunnion level, retracting his station when the gun is fired and on the move.

Quite simply — and there is little disagreement about this among the Swedes or anyone else — this is entirely acceptable in the role for which *UDES XX 20* is designed — a high-mobility, moderately protected antitank and direct-support gun for infantry brigades in extreme terrain. It is a non-starter for MBTs and the like.

Pop-Up Gun: (schematic based on a rejected solution for *UDES 40 (figure 5) ELKE* prototype (figure 6)). This has to be the design solution around which controversy is gong to rage. It may in the end prove to be a sound one; but my fear is that it's superficial appeal will generate such a head of steam among users as to force designers in a technologically dubious direction. I have rehearsed the arguments at length elsewhere, and will just summarize them here. First, one must distinguish between *ELKE*, a contender for the light mobile protected gun (LMPG) role developed on the *M2/M3* hull as a variant of the improved TOW vehicle (ITV), and a fully-dedicated MBT successor with a pop-up gun. *ELKE* is broadly comparable to *UDES 20* and could provide the basis of a highly cost-effective solution in that group of roles. I will base discussion on the rejected *UDES 40* concept (figure 5). This seems greatly preferable in terms of survivability to proposals with under-gun carousels, even if the crew is in a separate compartment in the hull. Rheinmetall's bustle autoloader, a rational development of the *M1* stowage system and now, one gathers, the preferred system for *LEOPARD 3,* is fine as long as it does not enlarge the silhouette of a slimline turret or an external mounting.

The pop-up gun makes its own case at a glance, so one need only look at the cons. This concept, like most of the others, is fine when you are sitting

nicely in "turret defilade" (the quotes because there may be no turret). To fire, you just pop up the gun — no need to move even. But it is going to take a finite time to get the gun up and 'laid' and when you are caught on a forward slope this is going to seem like an infinite time! If you have to keep the gun raised when you are in contact and exposed, there seems little point in retracting it at other times.

The next snag affects user and designer alike. For an external mounting layout with the primary VSSS at the top, the trunnions need to be only 250 to 300-mm above the hull roof for a 10-degree depression. But if, as with the pop-up gun, the VSS is at the front of the hull roof, the gun in depression will have to clear the front of the VSSS heads as well and this may mean doubling the height of the trunnions above the hull roof.

For starters, this will result in a significant change in the height of the vehicle's mass center when the gun is raised or lowered. Unless a pillar mounting proves acceptable — and this looks as improbable to me as it evidently did to Sven Berge and the Swedish users — a yoke mounting with a retraction depth of 500 to 600-mm is going to put back into the armored envelope most of the expensively armored air that one has at last succeeded in eliminating.

On ballpark figuring, raising the gun in under five seconds is going to take between 10 and 20 kw, admittedly not an impossible demand in terms of electrical fighting loads for modern MBTs. But to my mind, the crunch point lies in accuracy of fire. With the VSSS in the hull, even a muzzle reference sight (MRS) will not reestablish zero when the gun is raised *unless the height between VSSS axis and bore axis is constant.* I just cannot see a hope of holding that height to the requisite accuracy, perhaps plus or minus 0.1 mm, when the gun is repeatedly raised and lowered in a dirty battlefield environment.

Possible Directions of Development

All these compromise solutions have one thing in common. They make my hackles rise; and I seem to bristling in good user and technical company. The U.S. Army Armor School did not lightly launch itself on the quantum jump to a crew-in-hull layout. Now it has landed safely, with the Surrogate Research Vehicles (SRVs) and the Tank Test Bed (TTB) to show for its boldness; to allow itself to be dragged back into the murky waters of compromise would, I am sure, be greatly against U.S. and NATO interests. On the other hand, there seems every likelihood that the American user, like his German opposite number, will put his foot down and demand room at the top.

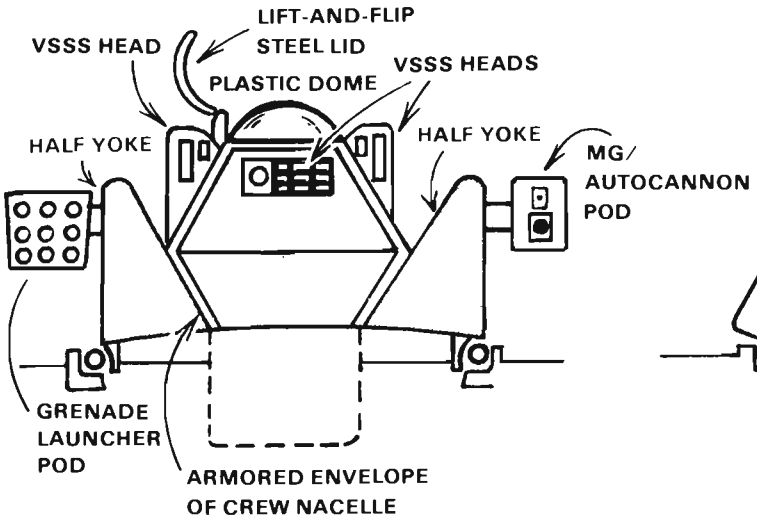
There look to be two paths which could turn a fruitless confrontation into a concerted step forward. They are convergent, or, at worse, parallel, and each has strong attraction on its own.

The LMPG Approach: There is an acute if not yet fully acknowledged need for a Light Mobile Protected Gun (LMPG) of equivalent quality to *M2* and *M3. ELKE* (figure 6) is a candidate for this role. But it would also be possible to bring in a 105-mm, or even the 120-mm smoothbore, on the *M2/M3* hull (on the same lines as the German and Swedish 105-mm *MARDER* rigs) using an external mounting and a trunnion-level VSSS. With German and Swedish experience to draw on, development should not be too costly, protracted, or problem-ridden.

This LMPG would be paired with the *M2* or *M3* in various organizations and roles, and would not normally be used by tactical commanders; so it would have to have a two-man crew. This would both fill an immediate need, and give the user a chance to get his teeth into the problems of crew-in-hull layouts. In parallel with this development, one might forsee a major product improvement of *M1,* using one of the compromise solutions outlined above.

The Gun Tank/IFV Pair

The other path is signposted by Fort Knox's recommendation of an integrated combat arm for the 86 force structure, and by two recent pieces of German user opinion. (I use the term "gun tank," incidentally, because this could be an MBT, and LMPG or something in between, like the *UDES 30* the Swedish-user rejected.) One gathers that *MARDER 3,* if it ever happens, is to have a two-man turret like *M2,* highlighting the need to use two pairs of eyes backed with both optical and optronic aids for the surveillance task. On the tank side, there is some wavering about tank commanders fighting opened up, but none at all about platoon commanders having to keep their heads out most of the time. These two



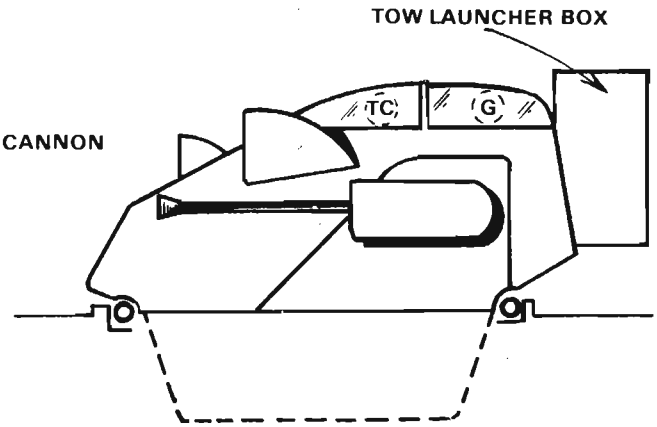


Figure 7.

Fig. 4. (Top left) The UDES 20 layout puts the TC in the right front of the hull in a "pop-up" armored sheath. Fig. 5. (left) UDES 40 concept placed the gun, rather than the TC, in a "pop-up" mounting. Fig. 6. (Right) ELKE prototype has crew in hull and elevated gun on Sheridan chassis. Fig. 7. (above) Author's concept of pod-mounted weapons alongside two-man nacelle.

points drive home the need for tactical control vehicles to have two men up.

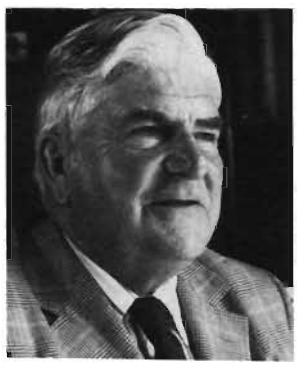
Let us for a moment ride with the historical APC-IFV trend towards more firepower and fewer men, and postulate an *"M2E1"* with a fire team of four rather than a squad of eight, and more punch up top — not too different from *M3* in fact. And suppose this "M2E1" to mount a cannon, a developed form of grenade launcher (automatic light mortar), and, say, improved TOW.

All these weapons systems differ from the tank gun in having no horizontal trunnion reaction, or a very limited one. *So you can offset them wide, and even outrig them.* This would allow you to put a tandem two-man nacelle (of the kind outlined above in figure 2b) on the center line of the "turret ring," with outward-facing half-yokes to take the armaments (figure 7). This gives you a configuration which at least looks right. The commander/gunner of the two-man "gun tank" fights his vehicle from the hull with a trunnion-level VSSS, receiving tactical direction and surveillance backup from the IFV. With the dismountable element down to a fire team, ballpark figuring suggests that this solution might also give you a vehicle pair based on *M2/M3* automotive subsystems *and* compatable with *C141B* aircraft.

Conclusion

Having used a subjective approach to save space, let me close with a blatantly personal view. The longer you look and the more standoff you take, the more the future seems to lie with both "topless" and "bottomless" tanks. Technologically and structurally, bottomless tanks are already with us — in the shape of the Airborne Assault brigade based on *HIND G* and *HIP* (with *HAVOC* to come) on the one hand, and the Divison 86's *ACAB* based on *APACHE* and *BLACKHAWK* (with *LHX* to come) on the other. Only new tactical thinking is needed to change the helicopter from a combat support weapon system into the mobility base of the fast maneuver force.

The topless tank will come, perhaps first in the shape of an LMPG for a light mechanized force. But the armor user will insist, and will be right to insist, on having room at the top in the MBT until the acceptability of toplessness is proven beyond a doubt.



BRIGADIER RICHARD E. SIMPKIN had an extensive responsibility for armored vehicle development during his long career with the British Army, including the Chieftain, Scorpion, and Anglo-German MBT programs. In retirement, he manages a language consultancy and is the author of several books, including the recently-published *Red Armour.*

Technical Intelligence and Tank Design

by Lieutenant Colonel William L. Howard

The United States was woefully unprepared for WW II. Its armed forces were undermanned and poorly equipped. In fact, much of the Army's equipment was obsolete, compared to that of other countries which were already involved in the war.

One of our most glaring weaknesses was our inability to collect technical intelligence. While the basic role of the fighting man had not changed over the centuries, the weapons he used had changed drastically, often with dramatic effect. Some in the Army's ranks knew that further technological innovations in weaponry could have equally dramatic effects on the outcome of the combat operations the Army was or soon would be engaged in. They considered it imperative that the Army stay abreast of both the current weapons system developments of our allies as well as the enemy powers.

The requirements for information on foreign technology as it applied to warfare were generated at the highest levels. The most immediate requirements for information dealt with German use of radar, rockets, and their progress in developing the atomic bomb. Immediate intelligence requirements were limited to troop dispositions, logistical support, and potential capabilities. The design and development of tanks, artillery, and small arms was a low priority.

Because of the industrial effort required to support both America and her allies, we could not extend a great effort on redesign of our main battle tanks. While there were efforts underway to develop new tanks, America's main battle tank was the *M4* and its improved versions. Technical intelligence information — or to be more precise, information on the technical capabilities of German weapons — came from the evacuation and analysis of materiel recovered on the battlefield. The detailed analysis of captured enemy materiel was conducted by the Foreign Materiel Branch at Aberdeen Proving Ground, home of the Ordnance Corps.

At Aberdeen, the Ordnance Corps and other technical services set up the Enemy Equipment Identification (EEI) units that traveled to the combat theaters to view and study captured weapons and equipment. In many cases, EEI units conducted training programs on the use of enemy equipment by soldiers in the field. The field training conducted by EEI units did not have any appreciable impact on operations until after the Normandy invasion in June, 1944. General George Patton, for one, made extensive use of captured German artillery during his drive across Europe.

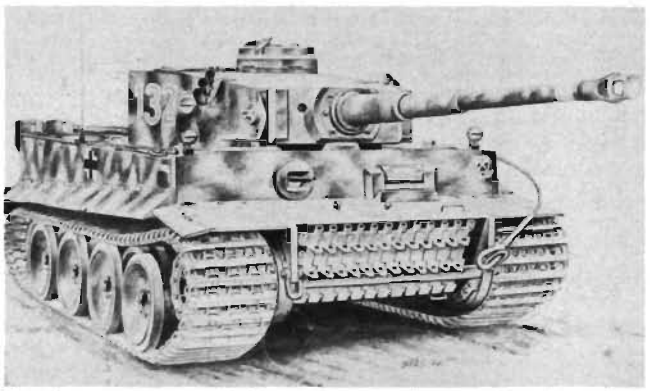
U.S. soldiers examine an unusual German vehicle, the 305-mm assault mortar mounted on a heavily armored Tiger chassis.

Capture of a *Tiger*

The most significant enemy vehicle to be encountered by the Allies during the war was the German *Tiger* tank, first used against the Russians. Exchange of technical information between the Soviet and British armies was never good during WW II, so that British knowledge of the *Tiger* was limited to gleanings from captured documents and POW interrogations. Not until the TORCH landings in North Africa did the British and Americans encounter the *Tiger.* It was a salutary experience, especially for tank battalions of the British 21st and 25th Tank Brigades equipped with the then-supposedly-invincible *Churchill III* and *IV.*

A break came during combat operations in April, 1943, when the German 501st Tank Battalion was forced to abandon a *Tiger* tank. After a preliminary examination by technical intelligence personnel, an initial report was signalled to MI 10, the branch responsible for technical intelligence on enemy equipment at the War Office in London. The vehicle was recovered by 21st Army Tank Brigade workshops, which replaced the damaged components from captured stocks and the remains of other vehicles. Little work was necessary; the turret had to be freed up, the turret hatches replaced, a smoke discharger cup and a few road wheels had to be mounted. The vehicle was put on display in the Tunis area before being shipped to England for detailed examination and testing. During its time in Tunis, the *Tiger* was examined by King George VI and by Winston Churchill, the British Prime Minister.

On arrival in England in 1943, the *Tiger* was sent to the School of Tank Technology (STT), a wing of the Military College of Science at Chertsey, Surrey. The tank was complete with its full complement of stowage and narrow rail travel tracks, waterproofing equip-



The German Tiger, at left, was used against the Russians, but poor technical intelligence did not prepare U.S. and British troops for their encounter with the 56-ton tank in the North Africa fighting. It clearly outclassed and outgunned even the newer Allied tanks. The Churchill, at right, was one of the newer British designs at the time.

ment, snorkel, and stocks of both HE and AP ammunition. At that time, STT had the task of examining and reporting on all captured enemy AFVs received in the UK and acting as a holding depot for these vehicles. The collection, along with Allied vehicles, later became the basis of the postwar Bovington Tank Museum.

After STT had issued its brief preliminary report in November, 1943, the *Tiger* was taken to London for display in the Horse Guards Parade, then returned to Chertsey for detailed testing, stripping, and examination by STT. The final examination report was issued in January, 1944. The introduction to this first installment of the final examination report stated, in its introduction:

"The *Tiger* is outstanding, being the heaviest AFV in general service, scaling approximately 56 tons in battle order. Its main armament is an 8.8 centimeter gun, while its heaviest armour (on the front vertical plate) is 102 mm. Another feature of outstanding tactical interest is its deep wading facilities. . . to a depth of 15 feet. Its size and weight impose tactical disadvantages, the most outstanding being the restriction on transportation due to its width, and its limited radius of action, due to heavy fuel consumption. . ."

Subsequent installments of the report covered the armament, power plant, fighting arrangements, stowage, and special devices and equipment, such as the deep-wading gear. The last installment was issued in September, 1944, by which time the vehicle had undergone automotive and wading trials at the Fighting Vehicle Proving Establishment (FVPE) and gunnery firing trials at the AFV School's experimental wing at Lulworth, Dorset. By this time, interest in this vehicle had been superseded by the necessity to examine and report on various models of the *Panther* tank, the *Tiger Model B,* and various self-propelled guns which had been captured in Italy and Northwest Europe.

As the war moved on and new equipment was encountered, the Ordnance intelligence effort moved along with the combat elements to evacuate the materiel. While jet airplanes, long-range rockets, and nuclear weapons captured the imagination of most high-level planners, research and development on new tanks and antitank weapons continued both in the U.S. and Europe.

When the war ended in 1945, these Enemy Equipment Identification teams were redesignated Technical Intelligence Detachments and were assigned to the various technical services. Ordnance TI teams, for example, conducted a detailed exploitation of the arms industries of Germany and Japan.

The *Tiger Model E* occupies a distinguished place in the history of tank design. It exerted a great influence on the U.S., British and Russian tank designers, particularly in the fields of firepower, protection, and deep wading. The postwar British emphasis on firepower in the *Centurion* and *Chieftain* programs certainly resulted from the wartime superiority of German designs, most especially from the shock of meeting the *Tiger*, which combined an even more powerful gun with armor frontally impenetrable to British tanks at virtually point-blank range.

Within the U.S., the postwar demobilization of the Army had begun, intelligence operations had been scaled back, and most of the technical services had eliminated their technical intelligence operations. The Ordnance Corps retained a small cadre of men at Aberdeen Proving Ground. Their efforts were limited in scope, compared to today's, and would not be of great value until the Korean War began.

In the case of the *Tiger*, the immediate conclusion that was reached was that its initial successes stemmed from surprise and subsequent successes from its firepower, mobility, and armor plate. If the U.S. and Russia had a better inteligence system prior to the start of the war, *Tiger's* initial successes would not have been achieved. While it is generally held that the Russians were able to field the best tank of its time, the *T-34*, their failure to keep their troops informed on enemy weapons probably contributed to their failures in the initial encounters. The Americans and the British did a much better job of keeping their people informed.

The Postwar Years

In April, 1945, Russian tank fleets smashed their way into Berlin and shortly thereafter Nazi Germany surrendered. The war in Europe was over.

As a result of the wartime Lend-Lease Program, the Americans had supplied a considerable amount of military materiel to the Soviet Union and, in exchange, we had been given several of their *T-34* tanks, which were taken to Aberdeen Proving Ground. Very little effort was expended on analysis of these tanks; however, some samples of the armor plate were cut out and tested before the tanks were put on display.

In the closing days of the war, the Soviets had also fielded the *Stalin* tank, a 46-ton vehicle that appeared in 1944 to counter the *Tiger.* In addition to the *Stalin,* work was also begun on improving the *T-34.*

The postwar technical intelligence organization in this country reverted to its prewar size. The Ordnance Intelligence Unit at the Pentagon continued its work on a smaller scale and a technical intelligence team at Aberdeen conducted extensive research into the foreign ordnance field, which was dominated by German equipment. Other than a review of the *Tiger* tank and later vehicles, it appears that little effort was made to integrate foreign designs into U.S. equipment, especially in the area of tanks, although considerable foreign technology was adopted in the development of long-range rockets and numer-

ous German scientists were brought to the U.S. to develop our missiles.

Captured German officers were interviewed to determine combat methods used against the Russians and numerous classified studies were prepared. In 1947, the Army developed the Aggressor program to add realism to training, but because of political reasons and a lack of Soviet equipment, the Aggressor program was not as effective as today's OPFOR (Opposing Forces) program.

The Korean War Era

". . . A strong force of North Korean infantry and tanks struck Task Force Smith as it stood alone in the roadway between Seoul and Ch'onan. For seven long hours, the Americans poured their howitzer, bazooka, mortar and small arms fire at the Russian-made tanks. . . Hopelessly outgunned and outmaneuvered, the tank-less Americans had received a grim baptism of fire.

". . . A few *Sherman* tanks began to make their appearance in combat, although their 75-mm guns were not a match for the heavier armament carried by the Russian-made *T-34s*. . ."

In June, 1950, the only functioning technical intelligence operation was the 528th Ordnance Technical Intelligence Detachment. With the outbreak of hostilities in Korea, the 528th deployed and in September, 1950, returned to the U.S., escorting the first *T-34/85* tank. The tank was placed on display in Washington and then sent to Chrysler for detailed engineering analysis.

Despite the supposed failure of American intelligence to predict the outbreak of the Korean War and the fact that our forces were outgunned in the early stages, U.S. tank designers had been in the process of developing tanks to match the Soviet tanks. With the start of the Korean War, the Army continued to press forward with new tanks. In October, 1950, design of the *M48* series of medium tanks began. Because of the war, production was authorized prior to the completion of any prototypes or testing. Ford, General Motors and Chrysler were awarded production contracts, but the first *M48* was not delivered until early 1953, too late to be a factor in the Korean War — and too late to have been influenced by the Soviet tanks recovered early in the war.

Numerous technical problems were discovered in the early production models of the *M48*, which delayed full-scale deployment until 1958. The tank was revised several times, the most recent version being the *M48A5*, which is still in U.S. service.

It's interesting to note that the early *M48* was equipped with deep-water fording gear, a requirement that probably developed from the analysis of the German *Tiger* two wars earlier.

Meanwhile, the Soviets had not been idle and had been working on upgrading their tanks. They developed the *T-44/85* in 1944 with improved hull, transmission, and suspension. By 1947, the *T-44* had been upgunned with a 100-mm gun, and the following year, the *T-54* was introduced. During this period, much of the information on the new Soviet tanks came from

An American soldier is dwarfed by the Jagdtiger, above, which mounted a 128-mm. main gun on a late Tiger chassis. At lower left, the German Pzkpw IV is inspected by curious U.S. soldiers at Kasserine Pass, North Africa. Japanese tanks were less of a factor in the Pacific, but the one pictured at lower right was active in Okinawa fighting.

intelligence sources abroad; it would be several years before the actual hardware got into the hands of American evaluators.

In retrospect, American technical intelligence in the Korean War was slow to respond and slow to become effective. Their mission was of limited value to the combat troops because of the short duration of the conflict, but the work was to be valuable in the future.

In meeting the overall requirement to gain an understanding of Soviet military capabilities, technical intelligence operations provided the basic analysis of Soviet equipment and industrial capabilities, and the foreign weapons training they conducted paved the way for training innovations such as the present program at the National Training Center.

The Korean War also showed that the U.S. could no longer remain in isolation from the world's problems. The war pointed out some serious shortcomings in our materiel acquisition process. These problems would be resolved in 1962, with the reorganization of the Army, but it would take several more years before the analysis of captured Soviet tanks would be used to forecast future trends in tank development.

Following the Korean War, ordnance technical intelligence operations were again scaled back. Under a new organization, ordnance technical intelligence units were to be assigned to each arsenal to provide expertise on foreign equipment encountered in combat. By this time, the foreign equipment being analyzed was basically Soviet.

The 507th Ordnance Detachment at TACOM translated the *T-54* operator's manual into English. Following the 1956 Hungarian Revolution, when a defecting tank crew fled to the West with several rounds of 100-mm ammunition from the *T-54,* the materiel was evacuated to Aberdeen for testing. Several of the 100-mm rounds were used in destructive testing of the experimental and radically new U.S. prototype, the *T-95*, which never reached production.

Personnel at Aberdeen, working under Colonel J.B. Jarrett, developed a series of manuals and a data base on foreign equipment. Much of the effort was aimed at letting American military attaches abroad know what the R&D elements had discovered about foreign materiel.

As a result of intelligence operations overseas, new Soviet weapons were identified and reported, the information becoming part of the Threat analysis. Some of this information influenced U.S. weapon development. Analysis of the 100-mm L/54 Soviet tank gun made it apparent that the 90-mm L48 gun of the *M48* was inadequate and led to the upgunning of the *M48* with the British-designed 105-mm gun now in widespread use.

As the 1980s approached, several events occurred which, on the surface, would seem to have little to do with tank design, but provided the impetus for future development.

A key event was the Russian success with Sputnik, which orbited the earth in 1952. One response to this technological surprise was the Defense Department's creation of the Defense Advanced Research Projects Agency (DARPA), an organization of scientists and engineers who worked on developing advanced concepts in science and technology that might yield important military applications.

In the mid-1950s, the Army created the Strategic Army Corps, a form of rapid deployment force consisting of the XVIII Airborne Corps and assigned units. Significantly, when the corps deployed for maneuvers, a technical intelligence detachment was assigned to corps headquarters.

By 1961, the Defense Intelligence Agency (DIA) was in place, acting to coordinate U.S. and allied intelligence and to manage the defense attaches all over the world, drawing their informatin together and analyzing it for the Joint Chiefs and the Secretary of Defense.

In 1962, the various technical servic-

Enemy tanks were rare in Vietnam, but this Soviet T-54 was one of several knocked out at An Loc.

es were reorganized under the new Army Materiel Command, which included, as one of its subordinate commands, the new Foreign Service and Technology Center. This organization centralized control and coordination of information coming in from the field from attaches and other sources.

The 1962 reorganization had a serious weakness; the lowest level that a technical intelligence element was authorized was at corps. This unit's function was to advise the corps commander, through his G2, of the capabilites of enemy weapons encountered in the field.

The Vietnam Era

As U.S. involvement in Vietnam began to expand, the 519th MI Battalion deployed to Saigon. The Combined Materiel Exploitation Center, composed of Ordnance, Signal, Chemical, Medical and Engineer detachments, fielded five "go teams" assigned to collect captured materiel.

Since the early Vietnam war was primarily an infantry/artillery operation, the weapons collected were Soviet-bloc small arms, *RPG-7* antitank rounds and *RKG-3M* antitank hand grenades.

In 1967, the 122-mm rocket was recovered, but the units had no success in recovering Soviet-built *PT-76* amphibious light tanks used just prior to the Tet Offensive in 1968 — either the vehicles were too badly damaged to recover or important components had been removed as war souvenirs.

When 100-mm tank gun ammunition was discovered — a tipoff that heavier armor might be used — the information was used to trigger a search for tank staging areas and to confirm the existence of the *T-54* tanks that were the North Vietnamese Army's prime armor weapon. The threat of meeting *T-54s* led to the hasty deployment of *TOW* missile units which arrived in time to stop the *T-54s* loosed in the 1972 offensive.

By 1971, however, most of the technical intelligence personnel had departed Vietnam and the collection emphasis shifted to the Middle East.

In the wake of the Arab-Israeli conflict, large quantities of Soviet materiel had been captured by the Israelis, including the *T-62* tank, which had first been seen publicly in 1965. The reports and photographs fueled a continuing intelligence effort to analyze Soviet weapons and to use this knowledge to improve our own.

Under the auspices of the Foreign Science and Technology Center, research and development labs under contract were studying Soviet equipment. In August, 1968, a report was prepared entitled "Armor Material - USSR" (U), the first comprehensive report on Soviet progress in this field. By 1972 this information became the basis for additional reports, including Ballistic Research Laboratory Report No. 1593, "Evolution and Forecast of the Soviet Main Battle Tank," (U), in June, 1972, and a classified report, "Antitank Weapon Systems," (U) which became the cornerstone of DARPA's work on liquid propellant guns, the automatic tank cannon, and long-rod penetrators, among other projects.

The next Arab-Israeli conflict, in October, 1973, also yielded numerous Soviet vehicles. The 519th MI Battalion, relocated at Aberdeen in 1976, began producing technical intelligence bulletins on the captured Soviet materiel. These reports, which were unclassified, were very useful to the field soldier and helped form the doctrine of the Opposing Forces (OPFOR) program and the Red Thrust detach-

The 1973 Arab-Israeli conflict yielded many Soviet-built vehicles, like this T-62 shown being analyzed at Fort Knox.

A Soviet-built BMP infantry fighting vehicle, also captured in the 1973 Arab-Israeli conflict, gets a once-over at Fort Knox.

ments, established at Fort Hood, whose purpose was to train Army units to field realistic opposing forces that would use Soviet tactics.

By September, 1976, the Rand Corporation had also produced a report, "Armor Development in the Soviet Union," which drew together all the previous technical intelligence work done during WW II, Korea and the early 1970s into one unclassified report.

Much of the technical intelligence gathered under these new programs found their way into the design of the *M1* with its revolutionary turbine engine, special armor, hypervelocity main gun, laser rangefinder, night vision equipment and computerized fire control.

But in the meantime, the Soviet tank designers have not been idle. Since fielding the *T-62*, they have followed with two newer models, the *T-64* and *T-72*. Details of these tanks are based on sketchy reports from observers, and photos of the tanks taken from the air. Despite several unsuccessful attempts, no actual hardware has come into the hands of U.S. personnel.

Some theorists contend that an even newer Soviet tank, the *T-80*, is merely an upgraded version of the *T-72* fielded to fool Western observers while the Soviets work on a really radical new tank design. Others believe that the *T-72 (M1981/3* is to be the main Soviet tank of the future. In any event, there must be hard, physical evidence to confirm or refute these theories, and this will be the work of technical intelligence operations in the future.

Summary

Based on past experience, there is considerable delay in getting captured enemy materiel to the rear for analysis. Apart from the normal hazards of combat, there are problems of transporting the materiel, pilferage of war souvenirs as well as a lack of qualified technical intelligence personnel at the combat unit level. Unfortunately, current organizational changes planned for combat intelligence units contain the same basic flaw of the past: the intelligence teams are to work at corps level. There has been no mention of where these people will come from. They do not have a career field in any branch. And there are no plans to have them at division level, where they are really needed.

So, until such time as the Army establishes technical intelligence operations far beyond those that now exist, it will fall to the nearest armor unit to safeguard and evacuate any captured enemy tanks or other materiel.

LIEUTENANT COLONEL WILLIAM L. HOWARD was commissioned in the Ordnance Corps after graduating from the Citadel in 1964. He is a graduate of the tank-automotive maintenance officer course and the CGSC. He served as commander of the 11th Military History detachment in France, and with the Combined Materiel Exploitation Center in Vietnam and, later, as a company and battalion commander at Fort Polk, LA. In 1973, he transferred to Armor and was an instructor in all phases at the AOAC. He has also served as consultant on Soviet armor and antitank weapons at Battelle Memorial Institute.

Forging the Chain

by Lieutenant General Walter F. Ulmer, Jr.

A ground combat force fights in small packets and depends on the initiative of the chain of command — the bottom links of the chain in particular.

How to forge a strong, reliable chain in a peacetime Army with a high rate of personnel turbulence remains a challenge. These guidelines are useful:

Hold immediate leaders responsible for instructing their soldiers in basic soldier skills. (Avoid the "committee" or "county fair" approach when teaching the basics).

Soldiers expect their leaders to be experts in basic soldiering. When first-line leaders (squad leaders, section chiefs, tank commanders, etc.) teach, they generate confidence among their subordinates. First-line leaders learn a great deal about their soldiers' strengths and weaknesses while teaching the basics to their soldiers. The teaching or coaching or instructing situation presents a unique opportunity to build teamwork and small unit spirit. Teaching in small groups permits attention to the individual needs of each soldier.

As the first-line leader teaches, the soldiers get to understand the standards which the leader expects in daily operations.

First-line leaders must have a chance to learn to be experts in teaching their soldiers. Commanders must review and refresh the skills of the first-line leaders as often as necessary. Training schedules must provide the opportunity for junior leaders to develop skill and confidence so they can teach effectively. (Make the training schedule and the duty roster work for you; don't end up working for them!)

When writing Senior Enlisted Evaluations on junior leaders, the successes and failures of their soldiers on such basic skill evaluations as the Common Task Test (CTT), physical training, and weapons qualification should be given some degree of consideration. Also, successes of subordinates on such voluntary efforts as the Expert Infantry Badge and the Expert Field Medical Badge may be considered. When the leader has had an appropriate opportunity to influence Individual Training Evaluation Plan (ITEP) results, the scores of his subordinates on those tests might also be reviewed by the rater in evaluating the performance of the leader.

Do not conduct mass classes or "county fair" instruction in basic skills. Such basics as disassembling individual weapons, putting on protective mask or clothing, reading map coordinates, taking an azimuth by compass, or adjusting headspace and timing of a cal .50 M2 MG should never be taught in a large class except in basic training, or perhaps in Advanced Individual Training. Soldiers and sergeants should never be taught such subjects simultaneously. To do so erodes the leadership position of the NCO, and specifically undermines the confidence the soldiers have in the expertise of their immediate leaders.

Some arguments for doing it the wrong way:

"If you have each NCO teach it his own way, you will not have uniformity. Also, the CTT (EIB, EFMB, etc.) require that the task be done exactly the same way. If we do it with one single instructor for the whole company, there is a better chance for everyone doing it exactly right."

Reply: This argument is faulty because essential (even if imperfect) uniformity can be attained if the NCOs have been well instructed — and perhaps tested — before they teach. It is worth the price of having some minor deviations in technique to gain the advantages of a strengthened chain of command. (If any test is so rigid that it demands the same instructor for everybody in the unit, then we need to examine the test and see if it is reasonable and realistic.)

"There is no time on the schedule for every NCO to teach his people. It is more efficient to teach all soldiers in the unit at the same time."

Reply: We need to plan ahead and make time for individual training. Basically, this should be 'NCO individual training time," or "sergeants' time," or some such category. Specific subjects do not need to be listed on the training schedule because different squad leaders may be teaching different subjects depending on the needs of the individual soldiers. It is rare that all the soldiers in a platoon are weak in the same individual skill. While company-size classes may be more efficient, they tend to weaken the chain of command, and they do not build up the NCO corps. On the battlefield, we must continue to teach, and such teaching must be decentralized.

Make the chain of command, Not the armorer, responsible for maintaining the soldiers' individual weapons.

Nothing is more fundamental than proficiency with well-maintained weapons. Junior leaders must be experts in the use and maintenance of the weapons of their soldiers. In the field, checks of weapon functioning and cleanliness must be made frequently — usually at a set time each day if the tactical situation permits. The critical node in the garrison situation is the acceptance of weapons into the arms room. Prior to storage in the arms room all weapons must be clean, lubricated, and checked for proper functioning by a leader.

The basic question is, "Who is re-

sponsible for the cleanliness, lubrication, and functioning of the weapon as it is turned into the arms room?" The answer is, "The chain of command. Not the armorer." The soldier's weapon should be checked by his immediate leader, and by whoever else in the chain (platoon sergeant, platoon leader, etc.) the unit leaders or the unit SOP require. When any member of the chain has pronounced the weapon as ready for turn-in, the armorer must accept it. (The armorer has no business inspecting it for anything but the correct serial number when he accepts it. It is an abdication of responsibility and a serious blow to the reputation of the chain of command when a SP4 armorer has the authority to overrule the squad leader or platoon sergeant on such a basic question as the cleanliness of an individual weapon! On the battlefield, the armorer will not be there to provide technical advice on cleanliness and basic functioning.)

Some arguments for doing it the wrong way:

"If the armorer doesn't check it, the weapons will be turned in dirty."

Reply: If that is so, there are two possible causes: the NCOs and junior officers don't know how to inspect weapons; or, they don't understand their responsibilities. Both of these causes can be fixed. If the armorer is the only expert, he can instruct the officers and NCOs in the fundamentals of weaponry. If the leaders don't understand their responsibilities, the unit commander can reorient them.

"The armorer is responsible for the weapons once they are in the arms room. Therefore, he must inspect them before he accepts them to protect himself and meet standards."

Reply: The armorer is responsible for safeguarding the weapons in his care, and for their organizational maintenance. If the weapons are dirty, he should not be held responsible. The chain of command must be held responsible.

"If the armorer can't inspect individual weapons, how can the company commander know if they are being properly cared for?"

Reply: The armorer can check weapons which are *in* the arms room if the commander wants him to do so. A spot check or even a 100 percent check for cleanliness and functioning by the armorer or somebody else in the unit is a good idea. The company commander should use the results to see how the chain of command is working. (The point is that at the time of weapons turn-in the armorer does *not* second-guess the chain of command and act as a standard-setter or quality control mechanism.

Make the chain of command, not the mechanics, responsible for dispatching vehicles

The preventive maintenance and safety checks appropriate prior to the dispatch of wheeled vehicles are designed to be performed by operators and the chain of command. Basic checks of vehicles to determine their capability to operate in a safe manner do not require the presence of a mechanic. First-line leaders are responsible for vehicles meeting requirements for dispatch. The chain of command, not the mechanic or motor sergeant, must provide the quality control and the supervision. (It is also a waste of a mechanic's time and skill to have him checking fluid levels, stop lights, windshield wipers, brake pedals, tire pressure, etc. Mechanics should be used almost exclusively to conduct scheduled services and make necessary repairs.) In compliance with the unit SOP, a member of the chain of command (or in some instances the driver himself) should inform the dispatcher that the vehicle is ready for dispatch. (The motor sergeant should *not* be involved routinely in the vehicle dispatch procedure.)

Spot checks of preventive maintenance could be performed by the chain of command prior to dispatch or at any other time. Checks of PMCS should be a part of a commander's inspection program, which might include a technical inspection of selected vehicles by a mechanic. But the mechanic has *no* routine role in the dispatch of vehicles.

Some arguments for doing it the wrong way:

"Many operators and first-line leaders don't know how to check a vehicle prior to dispatch."

Reply: Instruct them in proper procedures. Test them to ensure they have it right. (If necessary, mechanics could be used to teach the leaders. Then the leaders teach the operators.)

"The chain of command is not always handy in the motor pool when a vehicle has to be dispatched."

Reply: Dispatching vehicles is important enough for some member of the chain of command to be present. If not, the driver must take responsibility. If the driver is found operating a vehicle which is not fit to operate, the chain of command must still be held responsible.

"We still need some kind of system to spot check vehicles and verify their PMCS and safety status.

Reply: This is basically a chain of command responsibility, but from time to time, an "outside" inspector may be used to ascertain the quality of operator maintenance. Mechanics, the Maintenance Assistance and Instructor Team (MAIT), leaders from another unit, inspectors from the direct support unit, or the commander himself may conduct a check of the PMCS. However, such checks should be done in the presence of the first-line leaders whenever possible. When deficiencies are found which the operator should have identified or corrected, the first-line leaders should be held accountable.

Minimize announcements in company formation. Pass most information to the soldiers through the chain of command (or through the bulletin board).

Important news of future events and policy changes should be passed to soldiers through the chain of command. The junior leaders should be told first, and should be given the background and details of the changes so they can answer questions from their soldiers. Never make public announcements of important events in formation which surprise the chain of command. Soldiers must expect that their first-line leaders are informed. (It is much better for the platoon sergeants to make most announcements in formation than for the first sergeant to make them.)

Some arguments for doing it the wrong way:

"The chain of command doesn't have time to get briefed on all the details of announcements the first sergeant must handle."

Reply: This may be true for some very routine matters, and there are some kinds of information which may be passed out to an entire company without impairing the chain of command. But if it is a change of policy or a change in training schedule, it is important enough for the leaders to be briefed in advance. For complicated administrative procedures about which the soldiers have questions, it is proper for the junior leader to refer the soldier up the chain of command or eventually to specialists — but the key point is that the junior leader is the first person contacted by the soldier, and that leader attempts to keep himself informed so he can handle the basic questions of his soldiers. The IG estimates that over 75 percent of complaints and requests for assistance could have been satisfied at the platoon level!

"The first sergeant or company commander can get the exact same words to the whole company. Passing instructions through the chain means that some of the message may get lost or changed."

Reply: True, it's difficult to pass complex messages exactly down or up the chain. But it's more important to use the chain in most cases than to worry about exactly the same words getting to all soldiers. In combat we pass messages through the chain. We should practice this skill in garrison. (The same arguments for large or "county fair" classes for teaching basic skills can be made for making a lot of announcements in formation, but these arguments are still weak.) There are times when the message is so urgent or complex that the unit commander or first sergeant will want to explain it personally to the entire unit in formation — but these instances should be rare.

Always give orders in your own name. (And insist that any subordinate do the same thing.)

A leader accepts the responsibility for the orders he gives. His authority is sufficient. In giving orders, he reinforces his authority and the authority of other leaders by being positive and enthusiastic. A leader says, "OK men, we are going to clean the machineguns tonight before we leave the motor pool," or "OK, men, I want you to get all the machineguns clean before we leave the motor pool" Leaders without the confidence or courage to pass on orders in their own name need to have their responsibilities and obligations clearly explained. Then they must act like leaders. In so doing, their authority and influence will grow. (Leaders never complain about unit orders, policies, missions, or other leaders in front of subordinates.)

Remember that training is even more important than the duty roster.

The unit first sergeant and commander must constantly review rostered duties so they are constructed and subsequently modified to support keeping small unit integrity in training. Every effort should be made by the chain of command to accomplish rostered duties by team, section, or platoon. (It is far better to zero out an entire squad for a day than to slightly reduce manpower from all squads and have to improvise NCO leadership for the details.) The duty roster must be used with flexibility so that training is given maximum priority. Designate essential training and then figure out which teams or individuals are available for details — not the other way around!

Some arguments for doing it the wrong way:

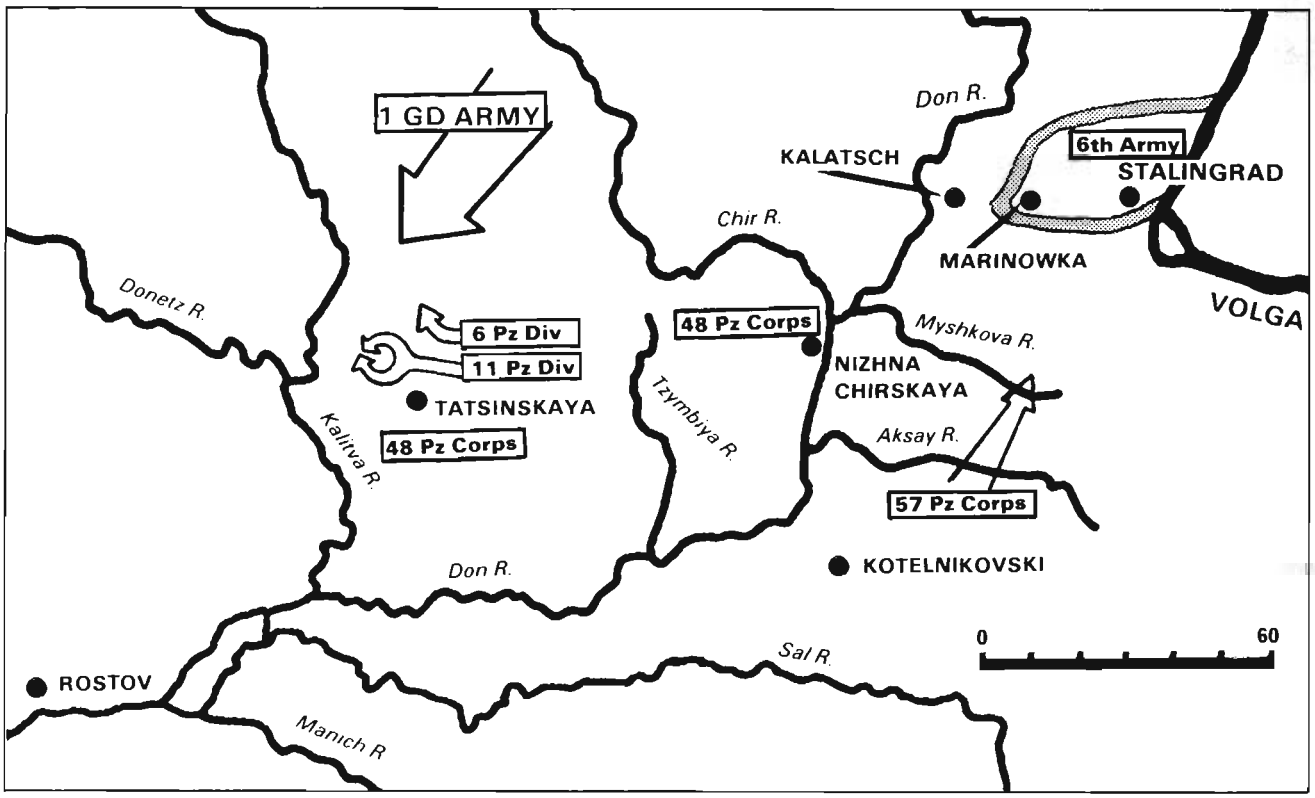
"There are just too many jobs that are better controlled by individual duty rosters than by assigning responsibilities to squads or sections. Using squads is inflexible and not adaptable to duty needs."

Reply: Rostered duties that soldiers are required to perform must be constantly reviewed by the chain of command. The first goal is to reduce rostered duties and get the soldier exposed to maximum training in his squad, team or section. For those duties that must be done, support team cohesion and the chain of command by giving responsibilities to small elements whenever possible. Think it out in advance. Work around the training schedule. (Try making the squad leader the CQ, with him selecting CQ runner, headcount NCO, etc.)

"If we don't adhere strictly to the duty roster, there won't be exactly fair sharing of duties among soldiers."

Reply: True. But in the long run it will probably work out to be reasonably fair to all concerned. But effective training is even more important than equity. Be as fair as possible without breaking up teams during key training activities.

LIEUTENANT GENERAL WALTER F. ULMER, JR. was commissioned in Armor from West Point in 1952. He commanded the 3d Armored Division from 1979 to 1982, and has commanded the III Corps at Fort Hood from 1982 to the present.



Tatsinskaya and Soviet OMG Doctrine

by Captain (P) Harold W. Coyle

The introduction of the Operational Maneuver Group has added a variable to the Soviet operational doctrine. The OMG concept provides Warsaw Pact (WP) commanders greater flexibility in offensive operations and poses a dynamic challenge to the defender who must now be prepared to deal with the OMG's sledghammer breakthrough attack or its rapier-like thrust.

A great deal has been written about the OMG's mission and organization and the relationship between OMG's and airborne brigades, but little has been written concerning what effects the OMG could have and what defensive countermeasures might be used to deal with it. It is the purpose of this article to study the historical employment of an OMG-like organization, the defensive reactions to its employment and the results the OMG obtained. The study will be based on the same source material we could expect the Soviets to use — the great Patriotic War of 1941-1945.

The action described here is the advance of the Soviet 24th Tank Corps in December, 1942 during the battles of the Don River Bend. While this specific example lacks some of the aspects of a modern OMG — most notably air assault — and had a slower tempo, the basic concept of employment of the 24th Tank Corps compares favorably to that of a modern OMG.

Background

The Soviet counteroffensive begun on 19 November, 1942, had achieved its initial goals by 24 November. The Soviet Army had encircled the German 6th Army and elements of the 4th *Panzer* Army in a pocket in and west of Stalingrad; destroyed the 4th Rumanian Army as a fighting force; mauled the 3d Rumanian Army and forced it back to the Chir River, and opened a 120 mile-wide gap between the German Army Group B in the north and Army Group A in the Caucasus (south). That the situation was not worse for the Germans was due to the efforts of German officers who, using great inititative and imagination, formed *ad hoc* combat groups from the rear services, 6th Army workshop personnel, engineers, flak units, and whatever odds and ends could be found.[1]

The first task facing the Germans was that of establishing a front across the gap between the two army groups. On 21 November, Colonel Wenck, Chief of Staff of the 57th *Panzer* Corps, was ordered to take up the post of Chief of Staff of the 3d Rumanian Army. He arrived there that evening and said: "My main task, to start with, was to set up blocking units under energetic officers, which would hold the long front along the Don and Chir along both sides of already existing Combat Groups, Adam, Stahel, and Spang, in cooperation with the *Luftwaffe* formations of the 8th Air Corps — at least on a reconnaissance basis. As for my own staff, I literally picked them up on the road. The same was true of motorcycles, staff cars, and communications equipment — in short, all those things which are necessary for running even the smallest headquarters. The old (experienced) NCOs of the Eastern Front were quite invaluable in this task: they adapted themselves quickly and could be used for any task."[2]

On 26 November, Field Marshal Erich von Manstein was ordered to create and assume command of a new

"The airfield at Tatsinskaya presented Badanov a lucrative target. . ."

army group, (Army Group Don), that would be responsible for the front between Army groups A and B. Von Manstein would command the 6th Army; Army Detachment Hollidt,as the *ad hoc* forces along the Chir and the Don were called, and the 4th *Panzer* Army. Though still under pressure, Army Group Don's front was stable by 30 November.

The second major task was sustaining the 6th Army by air. On 24 November, a *Fuehrer* Decree established Fortress Stalingrad, requiring the 6th Army to maintain its current position in Stalingrad and along the Volga River and tasking the *Luftwaffe* with supplying the encircled forces by air.

From the beginning, the task was beyond the *Luftwaffe's* capability. The Stalingrad pocket had a 240-mile perimeter measuring 40 by 80 miles on 28 November. Within the perimeter were 270,000 to 330,000 troops from five corps, 6th Army support personnel, and other Axis formations.[3] The 6th Army regarded 600 tons of supplies a day as desirable and 300 tons a day as the bare daily minimum to sustain itself.[4]

The two men charged with organizing and controlling the airlift were General Freiherr Wolfram von Richthofen (cousin of the late Red Baron of WW I fame), commander of the 4th Air Fleet, and Lieutenant General Feibig, commander of the 8th Air Corps. Both men argued against the airlift, but failed. General Fiebig began with literally nothing. He established his base of operations at an airfield outside Tatsinskaya and that, along with another airfield at Morovskaya, would serve as the airhead for the operation. With air transport and service units arriving from all over Europe, some of whom arrived in Russia in midwinter wearing summer-weight clothing, airlift operations began on 24 November. But the results desired were never achieved. Adverse weather, poor ground facilities, enemy flak and air interception all took their toll of crews and aircraft. The result was that daily averages of supplies reaching the pocket between 25 November and 11 January were 104.7 tons with the best day's single total reached on 19 December with 289 tons delivered and 1,000 wounded evacuated.[5]

With the Don front somewhat stabilized and air resupply initiated, the Germans turned their efforts to mounting a relief attack from outside the Stalingrad pocket. To accomplish this, von Manstein organized an army-sized combat group under Colonel General Hoth — Army Detachment Hoth. The main strike force of Army Detachment Hoth was the 57th *Panzer* Corps, consisting of the 6th and 23d *Panzer* Divisions with a tank strength of 136 and 96 respectively.[6]

The relief effort required the 57th *Panzer* Corps to attack east of the Don along an axis from Kotelnikovo-Kruglyakoyo-Stalingrad. A supporting attack by the 48th *Panzer* Corps would move along the west bank of the Don from a bridgehead at Nizhna-Chirskaya along an axis from Nizhna-Chirskaya-Katch-Marinowka. The 57th *Panzer* Corps initiated its attack on 12 December.

Soviet reaction, unlike that in past battles, was swift and decisive. All mobile Soviet units, primarily the 13th Tank Corps, the 235th Tank Brigade, and the 87th Rifle Division, were stripped from the Stalingrad Front's reserve and sent to the Aksay River. These forces were able to hold the 57th *Panzer* Corps, now reinforced by the 17 *Panzer* Division, at the Aksay until 19 December when the 6th *Panzer* Division finally broke through.[7] In the meantime, STAVKA (Supreme High Command), dispatched the 2d Guards Army to establish a line along the Mishkova River while the previously mentioned units bought time for the 2d Guards Army to reach its positions and deploy.

The supporting attack by the 48th *Panzer* Corps that should have caused a diversion of available Soviet assets away from the main relief attack was never initiated. Instead, the 48th *Panzer* Corps was itself diverted to counter a new Soviet effort along the Chir.

Advance of the 24th Tank Corps

On the morning of 15 December, the Soviet Southwest Front began the next series of attacks by plowing into the 8th Italian Army along the Chir. The ultimate objective was Rostov, an objective, that if realized, would isolate Army Group A in the Caucasus. The encirclement of 300,000 men at Stalingrad would pale in comparison to the 1,000,000 men and their equipment that composed the 1st *Panzer* Army and the 17th Army that made up Army Group A.

Of the four Soviet armies participating in this attack (1st Guards, 3d Guards, 5th Tank and 6th), the 1st Guards Army's[8] progress was impressive. Within two days, the 8th Italian Army collapsed and ceased to exist as an effective fighting force. The 24th Tank Corps of the 1st Guards Army surged ahead and in five days covered 150 miles, arriving in the vicinity of Tatsinskaya on the evening of 24 December.

A Soviet tank corps at this time consisted of three tank brigades, each having two 23-tank battalions, one motorized rifle battalion, one motorized rifle brigade, and two self-propelled artillery regiments.[9] While it was not unusual for some Soviet tank corps to have additional units, such as a rifle division or cavalry formations, it does not appear that the 24th Tank Corps was so reinforced.

The commander of the 24th Tank Corps, Major General V.M. Badanov, knew his mission and what was at stake. The operation to sieze Rostov and isolate Army Group A was codenamed *Saturn* and was divided into two phases: *Little Saturn* consisted of the initial breakthrough and the seizure of the airfields at Tatsinskaya and Morozovsk. *Big Saturn* envisioned the seizure of Rostov and the isolation of Army Group A.[10]

The complete collapse of the 8th Italian Army and the lack of mobile reserves left a vacuum into which the 24th Tank Corps plunged. The boldness and the speed of the corps' advance placed it out of range of mutual support from other 1st Guards Army units. But these were heady times for the Soviets, succeeding wherever they went. So the risk being run by the 24th Tank Corps did not seem too great.

The airfield at Tatsinskaya presented Badanov a lucrative target. On the field itself were about 180 *Ju52* trimotor transport planes that, along with the *He111* twin-engined bombers at the airfield near Morozovsk, made up the entire airlift capacity for the air resupply of the Stalingrad pocket.[11]

The 8th Air Corps controlled the air-

lift from the Tatsinskaya airfield which also served as a railhead with supplies destined for the pocket stockpiled at the nearby train depot and on the airfield. As a result, the Tatsinskaya area contained a high density of transportation units, service units, communication units and medical units to handle casualties coming out of the pocket. To defend this operation from air and ground attack were 120 men, one 88-mm flak gun and six 20-mm flak guns.[12]

The Germans knew that Soviet mobile groups were roaming around in their areas, but did not know where. Permission to move the airlift operation further to the rear was denied. To have done so would have required more than simply displacing the aircraft and would have reduced the number of sorties from three a day, under ideal conditions, to one. Additional security forces were not readily available — everyone who could fight and everything that could shoot had been formed into *ad hoc* battle groups and committed to Army Group Don. Solutions to this sad state of affairs were being worked on but would take time to implement. Air operations at Tatsinskaya continued as usual on 23 December.

At 0530 on 24 December, the Soviets announced their presence with a 10-minute artillery barrage, followed by a tank attack. The Germans were in complete chaos and General Fiebig watched in silence as many *Ju52s* were destroyed by the advancing tanks or in collisions with each other as they scrambled to takeoff. When a tank passed by the base of the tower, an aide took General Fiebig by the arm, told him it was time to go, and led the general away.[14]

That 124 of the aircraft from Tatsinskaya were able to reach other airfields under the conditions that existed was a miracle in itself. This, however, was small consolation in light of the fact that over 50 aircraft were lost, the service and support personnel with their equipment and spare parts were lost or scattered, supplies accumulated and waiting airlift were abandoned, the primary airlift airfield was in enemy hands, and a new operation had to be pieced together at other airfields further to the rear. The effectiveness of the loss of Tatsinskaya can be measured by the fact that on 26 December, 38 *Ju52s* and 3 *He111s* delivered only 70 tons to the Stalingrad pocket.[15]

German Reaction

By 23 December, the attack of the 57th *Panzer* Corps had been halted. The 6th *Panzer* Division had reached the Mishkova River on the morning of 20 December at Vasilyevka, placing it only 35 miles, straight-line distance, or 40-45 road miles, from the Stalingrad perimeter. By this time, however, the 2d Guards Army was in place and stopped the advance. Even with the addition of the 17th *Panzer* Division, the 57th *Panzer* Corps was hard pressed to simply hold the bridgehead across the Mishkova. Breaking through to the pocket without further assistance appeared to be out of the question for the 57th *Panzer* Corps.[15]

The supporting attack by the 48th *Panzer* Corps had been postponed as a result of the success of the Russian Southwest Front's attack. With all mobile forces outside the pocket committed, the only option open to the Germans was to have the encircled forces conduct a supporting attack for the purpose of covering the last 35 miles between the pocket and the 58th *Panzer* Corps. This operation was known as *Winter Storm*.[16] Orders to initiate this operation were transmitted to the 6th Army at 1830 on 19 December from Army Group Don.

There was, however, a reluctance on the part of General Friedrich Paulus, commander of the 6th Army, to initiate *Winter Storm*. Of the two plans of action available to the 6th Army, *Winter Storm* was the most limiting, requiring the 6th Army to continue to hold all positions while conducting the breakout attack. Paulus desired to execute the second plan of action, *Thunder Clap*, an operation that would evacuate the entire Stalingrad pocket while conducting the breakout attack. But Hitler would not allow this and an impasse was created between the 6th Army commander and Army Group Don.

The reply to Army Group Don on 19 December from the 6th Army stated that the army's tanks, approximately 100 at this time,[17] and part of its infantry, were tied up repulsing Soviet attacks on the perimeter. The 6th Army went on to further state that it would require three days to mass the units required for the breakout, once they were available, and to initiate the attack.[18] This state of affairs, with the 57th *Panzer* Corps unable to make any further progress and the 6th Army failing to initiate a breakout attack, would continue until 23 December.

During this standoff period between the 6th Army and Army Group Don, the Russian Southwest Front's success along the Chir began to influence the efforts of Army Group Don to relieve the 6th Army. The first result was the postponement and finally the cancellation of the 48th *Panzer* Corp's supporting attack from Nizhna-Chirskaya. This allowed the Soviets to concentrate all available reserves against the only active relief effort, the attack of the 57th *Panzer* Corps.

By 23 December, the advance of the Soviet 24th Tank Corps could no longer be ignored. Although the airlift operation was not even achieving minimum requirements, a sharp reduction in the current level of air resupply would only make matters worse; and it was becoming increasingly evident that the Soviets' advance was endangering this operation. Of growing concern was the possibility of the Soviets seizing Rostov, through which most of Army Group A's supplies flowed. Even a temporary severing of this line of communications would be intolerable. A permanent severing would be disastrous.

Hard decisions had to be made, and made quickly. On 23 December, the

"The attack of the 48th Panzer Corps was a well-planned and expertly executed maneuver..."

48th *Panzer* Corps was detached from the 3d Rumanian Army and dispatched to Tatsinskaya. But after a month of continuous fighting along the Chir, the 15th *Panzer* Regiment of the 11th *Panzer* Division, the 48th *Panzer* Corp's only *panzer* division, was down to 25 operational tanks.[19] Additional mobile forces had to be added to the 48th *Panzer* Corps if it was going to have any success in dealing with the Soviet advance. The only source of reinforcements for the 48th *Panzer* Corps in the Don Bend was the 57th *Panzer* Corps, now stalled at the Mishkova. To take combat forces from the 57th *Panzer* Corps would require the suspension of the relief attack. Failure to reinforce the 48th *Panzer* Corps could result in that corps being unable to stem the Soviet advance.

The decision to strip forces from the relief force came from Hitler on 23 December under the proviso that the current relief force positions were held. The possibility of doing that without assistance seemed dim, since the 2d Guards Army was taking every opportunity to attack the German bridgehead across the Mishkova. Von Manstein turned to the 6th Army for this assistance, pushing for Paulus to initiate *Winter Storm.* In a series of radio-teletype messages from 1720 to 1820 on 23 December, Paulus was informed of the situation as it then existed, including the danger to the airlift airfields, the inability of the 57th *Panzer* Corps to make any further progress, and the need to shift forces from that corps. Von Manstein stated that he anticipated that he would soon have permission to initiate *Thunder Clap.* In the interim, he urged Paulus to initiate *Winter Storm* in order to effect a link-up with the 57th *Panzer* Corps.[20]

The reply from the 6th Army provided no hope. It stated that the 6th Army would require six days to prepare for *Thunder Clap* and that there was only sufficient fuel in the pocket for the 6th Army's link-up forces to move 20 miles. The position that Paulus then took was unrealistic in view of the existing events. Paulus demanded that either the 4th *Panzer* Army (the 57th *Panzer* Corps), advance within 20 miles of the pocket, something that would already have been done had it been possible, or that his supplies be brought up to certain levels before he initiated any action. This last demand included 4,000 metric tons of fuel[21] and 500 tons of food. In light of the poor performance of the airlift to date, and the danger that then existed to the airlift bases, this demand was beyond von Manstein's resources.[22] In effect, the 6th Army elected to allow the situation to continue as it was. Von Manstein, on the other hand, could not stand idle.

On 23 December, the 6th *Panzer* Division was ordered to break off its attack and move to Tatsinskaya where it would come under the command of the 48th *Panzer* Corps. The withdrawal of the 6th *Panzer* Division would leave only 35 operational tanks in the 57th *Panzer* Corps.[23] Starting on 24 December, the 4th *Panzer* Army (57th *Panzer* Corps) would receive a series of attacks from the 2d Guards Army, the 51st Army, and units withdrawn from the forces surrounding Stalingrad. Within two days, 57th *Panzer* Corps would be forced back to the Aksay and the only serious attempt to relieve Stalingrad would be over.

Attack of the 48th Panzer Corps

The counterattack against the Russian 24th Tank Corps would combine delay and blocking actions by the 6th *Panzer* Division to isolate the 24th Tank Corps from the 1st Guards Army while the 11th *Panzer* Division, working with the 306th Infantry Division, employed pincer and flank thrusts directly against the 24th Tank Corps to encircle, then eliminate it.[24]

Despite the severity of the situation and the initial dispersion of the forces involved, the attack of the 48th *Panzer* Corps was a well-planned and expertly executed maneuver that dealt with a serious situation in minimum time.

The first move by the Germans was the isolation of the 24th Tank Corps. As early as 24 December, an advanced detachment of the 6th *Panzer* Division, supported by assault guns, captured the area north of Tatsinskaya. As the remainder of the 6th *Panzer* Divison closed up, blocking positions were established along a stream called the Bystraya. Between 25 and 28 December, efforts by a relief force of two motorized corps and two rifle divisions to reach the 24th Tank Corps were repelled by the 6th *Panzer* Division.[26]

At Tatsinskaya, the 306th Infantry Division approached from the east, sending assault parties from the 579th Grenadier Regiment to recapture parts of the airfield. The 11th *Panzer* Division, also approaching from the east, moved around the 306th Infantry Division and encircled the 24th Tank Corps.[27] By 27 December, the Soviet forces at Tatsinskaya had been fixed and encircled, thus denying them freedom of maneuver and isolating them from assistance and resupply.

The confidence of General Badanov disappeared as the German forces moved swiftly against his command. Radio messages in the clear urged the 1st Guards Army to come to the relief of the 24th Tank Corps. Pressure to relieve the tank corps and continue on to Rostov also came from the top. In a conversation with General Vatutin, commander of the Southwest Front, Stalin ordered Vatutin to send the 2d and 23d Tank Corps to relieve Badanov and continue on to Rostov. Stalin also lectured Vatutin on the employment of tank corps, pointing out that it was better to use two tank corps together when operating over great distances. This advice, however, given on 29 December, came too late for the 24th Tank Corps.[28]

In a series of attacks during the night of 27-28 December, the 11th *Panzer* Division and the 306th Infantry Division destroyed the encircled tank corps. The fighting was close and savage and wounded on both sides froze to death where they fell.

Many Soviet groups fought to their last round. But despite their efforts, the battle was over by daylight and with the exception of a few small groups that were able to escape and make their way north to the 1st Guards Army, the 24th Tank Corps had ceased to exist.[29]

Aftermath

The question of 'who won' can be answered in several ways, depending on your viewpoint. On 28 December, the Germans held the battlefield at Tatsinskaya, had recaptured the airfield, had eliminated a tank corps and had temporarily stopped the Soviet drive on Rostov. This was a substantial tactical victory.

From an operational strategic standpoint the opposite is true. The vacuum created by the loss of the 8th Italian Army still existed. The destruction of the 24th Tank Corps only eliminated

the vanguard of one of the Southwestern Front's advancing armies. Thus, the threat to Rostov was still very real and had to be dealt with. The attacks against the 57th *Panzer* Corps had not stopped. The 4th *Panzer* Army was being forced back to the Manich River, further and further from the Stalingrad pocket. The problem was no longer one of relieving the 6th Army, it was now that of saving Army Group A.

To stave off a greater disaster, Hitler ordered the evacuation of the Caucasus on 29 December, a move that sealed the fate of the 6th Army.[30]

While the Soviets never achieved their ultimate objective, they were successful in disrupting the airlift and causing the Germans to draw forces away from their effort to relieve Stalingrad. By the use of their numerical superiority, the Soviets were able to attack at various points along the front. They kept the Germans off balance and forced them to react to the Soviet initiatives. German efforts to stabilize the front and regain the initiative were not realized until late January.

Lessons for a Modern Commander

While there are many instructive aspects of the battle at Tatsinskaya for the modern commander, I will confine myself to those that can be applied to dealing with an OMG; specifically, the effects on the overall conduct of operations, the effects on logistic operations, and methods of dealing with an OMG.

Once some semblance of an organized front was established, Army Group Don directed all efforts to organizing and launching a relief effort and resupplying of the 6th Army. With only limited resources available, the need to achieve unity of effort, gain the initiative, and drive the battle along the lines that the Germans wanted was totally dependent upon throwing the Soviets off balance or hoping that they would not apply any serious pressure in the Don River Bend during the relief operations. The advance of the Southwest Front and continuous pressure against the 6th Army prevented any of this from happening.

The rapid advance of the 24th Tank Corps brought pressure to bear on Army Group Don by dislodging its flank, endangering the air bases at Tatsinskaya and threatening isolation of Army Group A. To meet this new pressure, resources tagged to support the relief effort, the 48th *Panzer* Corps' supporting attack, were diverted. Without this supporting attack, the 57th *Panzer* Corps presented the only threat to breaking the Soviet encirclement. The Soviets were, therefore, able to pile all available reserve forces against the 57th *Panzer* Corps, stopping that corps short of its objective.

Given the present-day numerical superiority of WP forces in Europe, it is not difficult to envision a Soviet front commander launching an OMG to keep the NATO forces from executing their own aggressive counterattacks as envisioned in the AirLand Battle concept. A Soviet tank division, roaming around in the rear of a NATO corps, would force a NATO army group commander to make decisions similar to those made by the Germans on 23 December 1942.

The effects of an OMG in the rear area of a NATO corps would be far more devastating than the 24th Tank Corps' presence at Tatsinskaya only because of the larger number of lucrative targets and the dispersion required due to the nuclear threat. We cannot expect our rear area support facilities to be any better defended than was the airfield at Tatsinskaya. Nor are our DSA and CSA operations much more mobile than were the German operations at Tatsinskaya.

A NATO corps commander with an OMG loose in his rear would be faced with the same situation that faced the Germans; shut down support and service operations and move them out of harm's way, if such a place exists, or leave them in place and possibly lose all of part of them. For, without substantial and equal combat forces, support area commanders cannot hope to beat off a tank regiment determined to destroy them.

The final point, how to deal with an OMG, is a subject that will long be open for discussion and debate. For my part, I put forth the argument that the manner in which we deal with OMGs be similar to the way in which the 48th *Panzer* Corps dealt with the 24th Tank Corps. First, isolate the OMG from its parent army and, if possible, from its counterparts, if operating along multiple routes. Next, fix it in place, denying the OMG freedom of maneuver and at the same time gathering intelligence about the OMGs exact composition, location of subordinate units, strengths and weaknesses, etc. This step should be conducted in conjunction with an effort to encircle the OMG, for encirclement is the ultimate means of fixing an enemy force. The final step is the elimination of the OMG through a series of well-planned, simultaneous, and coordinated combined arms attacks at numerous points in order to deny the OMG commander the ability to shift reserves to deal with a succession of attacks. Furthermore, these attacks should be as violent and overpowering as possible in order to capitalize on the psychological effect the isolated and surrounded defenders wll be suffering.

To avoid the problem encountered by the German commanders in dealing with the 24th Tank Corps, the modern commander must keep close tabs on all units in his area of operation. Reserve units, depleted units undergoing reconstruction, and transient units will provide the reaction force that will initially deal with the OMG. The status of these units and their capabilities must be monitored. On-order contingency missions, within their capabilities based on areas of responsibilities or preestablished conditions, should be given to these units to reduce reaction time. All

"The OMG is, in reality, not a new phenomenon. . ."

efforts to use appropriate force without interfering with ongoing operations must be made. Otherwise, the Soviets win.

Conclusion

It is important that we understand our enemy and prepare ourselves to meet him. The OMG is, in reality, not a new phenomenon that the Soviets have pulled out of thin air. It is the revamping of proven tactics to which air assault and modern weapons have been added. Because of this, the tempo of an OMG's operation will be far more rapid and lethal than were the old Soviet mobile groups. But they can be dealt with. The same technology that has increased the lethality of the mobile group has provided weapons and transport far superior to those the Germans had. Most notable are the attack helicopter, air mobility using helicopters, and rapidly emplaced area denial weapons such as FASCAM (family of scatterable mines). Practicing employment of *ad hoc* forces, as well as designated reaction forces, is the direction our efforts should now turn to in the great OMG debate.

CAPTAIN (P) HAROLD W. COYLE was a distinguished military graduate with a bachelor's degree in history from VMI in 1974. He served with 3d Battalion, 68th Armor, as a tank platoon leader, tank company XO, S3 air, and commander of Company A. He was an honor graduate of the Infantry Officer's Advanced Course of 1980 and has served in the Weapons Department, USAARMC, Fort Knox, Ky, as Chief, *M1* Branch and Chief, Gun Management Branch. He is currently the armor advisor to the Readiness Group Knox.

Footnotes

[1]Paul Carell, *Hitler Moves East,* Bantam Books, N.Y., 1965, p. 646.
[2]Ibid, p. 646.
[3]Units encircled at Stalingrad were: Corps: 4th, 8th, 11th, 14th *Panzer* and 51st. Infantry Divisions: 44th, 71st, 76th, 79th, 24th, 100 Jaeger, 113th, 295th, 305th, 371st, 376th, 389th and 397th. *Panzer* Divisions: 14th, 16th and 24th. Motorized Divisions: 3d, 29th and 60th. Antiaircraft Division: 9th. Rumanian Divisions: 1st Cavalry and 20th Infantry. Also, one Croatian regiment.
[4]Carell, op cit, p. 652.
[5]Ibid, p. 653.
[6]Ibid, p. 650.
[7]Ibid, p. 651.
[8]At some point in time, the old 1st Guards Army was redesignated the 3d Guards Army and another army was given the title 1st Guards Army. This leads to some confusion when tracking who the 24th Tank Corps belonged to as some references place it in the 1st Guards and others place it in the 3d Guards.
[9]DA PAM 20-233 *German Defensive Tactics Against Russian Breakthroughs,* Oct. 1951, p. 160.
[10]William Craig, *Enemy At The Gates,* E.P. Dutton & Co., Inc., N.Y., 1973, p. 301.
[11]Paul Carell, *Scorched Earth,* Ballantine Books, N.Y., 1971, p. 121.
[12]Ibid, p. 121.
[13]Major General F.W. von Mellinthin, *Panzer Battles,* University of Oklahoma, Norman OK, 1956, p. 171.
[14]Craig, op cit, p. 296.
[15]Carell, *Hitler Moves East,* op cit, pp. 650-651.
[16]Some sources translate the German code word *Wintergewitter* as *Winter Tempest.*
[17]Field Marshal Erich von Manstein, *Lost Victories,* Henry Regnery Co., Chicago, 1958, p. 330.
[18]RRT message from Chief of Staff, 6th Army, to Army Group Don, 2030, 19 December. From *Hitler Moves East,* op cit, p. 656.
[19]*Scorched Earth,* op cit, p. 123.
[20]Craig, op cit, p. 277.
[21]250,000 gallons.
[22]Manstein, op cit, p. 339.
[23]These 35 tanks were consolidated under the 17th *Panzer* Division; Mellenthin, op cit, p. 193.
[24]DA PAM 20-233, op cit, p. 178.
[25]*Scorched Earth,* op cit, p. 125.
[26]Ibid, p. 125.
[27]Ibid, p. 125.
[28]Craig, op cit, p. 301.
[29]*Scorched Earth,* op cit, p. 125.
[30]Craig, op cit, p. 310.

UCOFT Is "Up" and "On the Way"

by Steven L. Griffin and David G. Kuma

The fielding of the Unit Conduct of Fire Trainer (UCOFT) — the Armor force's billion-dollar commitment to excellence in gunnery training worldwide — is fast becoming a reality. For three reasons, this fielding represents much more than the introduction of a training device. First, the UCOFT is more than a device. It is a system that trains gunnery via simulation —simulation that so well approximates the full range of expected battlefield conditions that the limits of current training are thrust dramatically forward. Second, the UCOFT is the core simulator for an Army-wide system of simulators: the ICOFT (Institutional COFT) and MCOFT (Mobile COFT, for USAR/NG units) are developing rapidly. Third the UCOFT opens the door to the power of new training technologies — computer simulation, computer-managed instruction, computer-generated imagery — which will affect Armor training for years to come.

The *M1* UCOFT has passed all testing. General Electric, the prime contractor for the system, has been given the green light by AMC and TRADOC to deliver the first four *M1* UCOFTs to the field. If you are in Vilseck or Schweinfurt, Germany, the *M1* UCOFT will be on the ground later this year. It will be ready for training in January 1985 at Vilseck, and March 1985 in Schweinfurt.

It is not enough for us to simply allow the UCOFT to arrive in your unit with a "here it is, use it" attitude. The UCOFT is being fielded with an extensive support network — from maintenance to instructor/operator training, and the Armor School has developed and is staffing and fielding a training support package to aid commanders in the integration of the UCOFT into the battalion training programs. But more on that later.

If you read the May-June 1983 *Armor* Magazine article "Armor Training Simulators Are On the Way," you already know a great deal about the UCOFT. If you are not familiar with the UCOFT, a brief summary of its purpose and capabilities follows.

Purpose

There's never been enough time, money, and ammunition to sustain year-round gunnery proficiency. This is the UCOFT's primary purpose. It is estimated that an average of 2 to 2½ hours of UCOFT training per month will continually build and challenge the gunnery proficiency of our tank commander/gunner teams.

The UCOFT is also ideally suited for cross-training unit loaders and drivers in gunner responsibilities, and gunners in tank commander duties, a training requirement often not accomplished due to time and ammunition allocations.

Particularly important, as we continue to transition our tank fleet to the *M1* and *M1A1*, is the UCOFT's ability to fill a transition training role. In units that have the *M1* tank and UCOFT, replacements with little or no *M1* experience can be trained up in gunnery using the UCOFT. Also, every effort is being made to field *M1A1* UCOFTs with or ahead of the unit's receipt of the *M1A1* tank, to aid in the transition requirement.

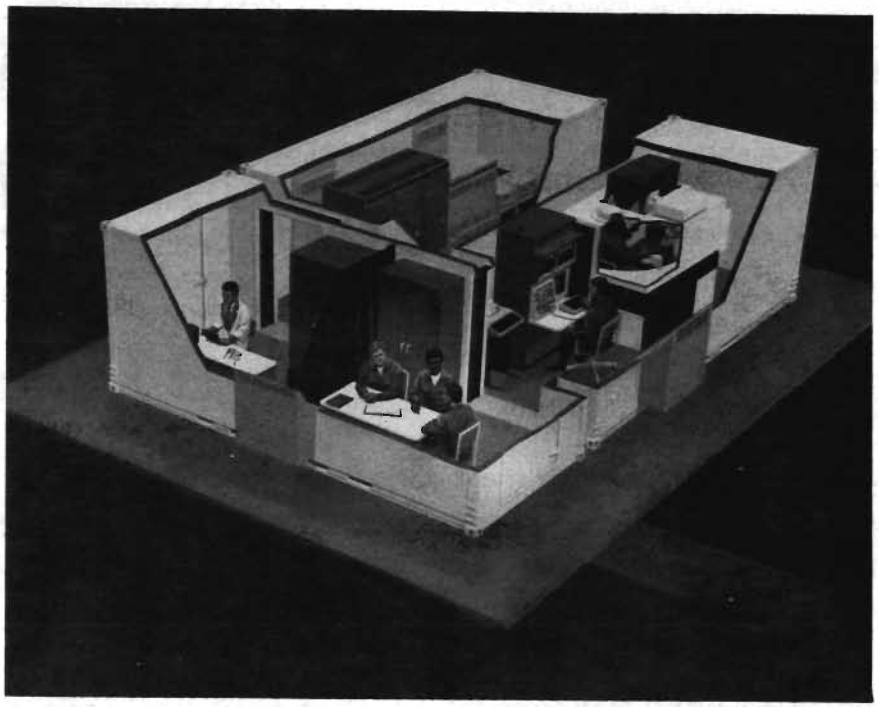
Finally, the UCOFT is uniquely suited to provide basic level gunnery training to the unit's non-Armor soldiers. Why? In combat, these soldiers may be needed as immediate battlefield replacements.

A technician at the evaluator's station sees both commander's and gunner's views on TV monitors. View on right hand screen is a magnified section of same view on screen at left.

Capabilities

Unprecedented. Without equal. There are no other ways to describe UCOFT capabilities. Under the control of platoon sergeant/platoon leader, the UCOFT synergistically combines computer monitoring of the crew performance, computer-generated imagery, and unique instructional software, to provide exciting, validated training. When your soldiers train on UCOFT, they are evaluated as a tank commander or tank commander/gunner team, in the areas of reticle aim (time and accuracy), system management, and target acquisition. Their performance in these areas determines their progression or regression within a set — called a matrix — of some 500+ gunnery exercises. (Diagram of Matrix, Figure 2)

When your crewmen begin training they will start with simple exercises — perfect visibility, a stationary tank engaging single, stationary, short-range tank targets, with no malfunc-



Artist's rendering shows layout of the three shelters that make up a UCOFT unit.

tions or other distractions. From there, they will progress through dawn/dusk engagements to limited visibility engagements and night engagements. Soon they'll be using the thermal imaging sight with TIS "clutter" and friendly and enemy incoming artillery fire to complicate the engagement. Since the UCOFT simulates malfunctions in the *M1* fire control system, they will also conduct engagements in different degraded firing modes. This is another breakthrough of the UCOFT: practice of more realistic battlefield conditions and problems without using up valuable ammunition and supplies. Indeed, with the UCOFT, your crews can practice engagements that are completely out of the question with real tanks and live ammunition, under conditions that are simply too dangerous to conduct or too expensive to stage on a live-fire range — all with the realism of battle, to include NBC environments.

Each group of exercises builds toward the next higher level of difficulty in the three dimensions of reticle aim, system management, and target acquisition. The computer keeps track of performance and automatically moves each crew through the training matrix. If a crew needs more practice in a certain area, the computer provides it. Most crews find they are weakest in long-range targets and multiple engagements, but everyone can proceed through the training matrix as fast as they can. The computer selects the next exercise based on previous performance.

Training

The UCOFT is a training system that will go far beyond just training for Tank Table VIII. It is the foundation upon which crews, sections and platoons develop and increase proficiency in gunnery for effective and successful functioning in combat. What does that mean? It means your soldiers stand a better chance of surviving because they will be faster and more accurate than before. But for this to happen, we cannot allow the UCOFT to be considered as simply "another device," or "a burden to an already over-taxed unit" in terms of time, people and other unit missions. It must be integrated into, rather than considered an adjunct to, the unit's training programs and strategy. Towards this end, the Armor School is developing a training support package (TSP) to aid the chain of command in using the UCOFT. It describes the capabilities and limitations of the UCOFT, relates the capabilities to the gunnery tasks, skills and knowledges which the unit must train, and provides suggestions for scheduling and management of the system. The TSP is not directive in nature but provides the nucleus for innovative thought on how and when to use the UCOFT. The package is part of a support network intended to aid unit leaders in smooth integration of the UCOFT into the unit's training program. (Figure 3)

The TSP will be in your hands before the UCOFT is ready to be used for training. It will provide, among other things, a suggested strategy for integrating the UCOFT into your unit's training programs. Several of the key principles within the TSP are outlined here.

Challenge and excellence. Unit leaders, starting with the battalion commander, must strive for excellence and accept the challenge to be the best. They must set the example. These are the motivators that will establish a competitive spirit and keep training exciting. Every crew will know exactly how far they have progressed in the UCOFT. Think "Challenge Match," "UCOFT Tournament," "Top 10 Guns in the Battalion."

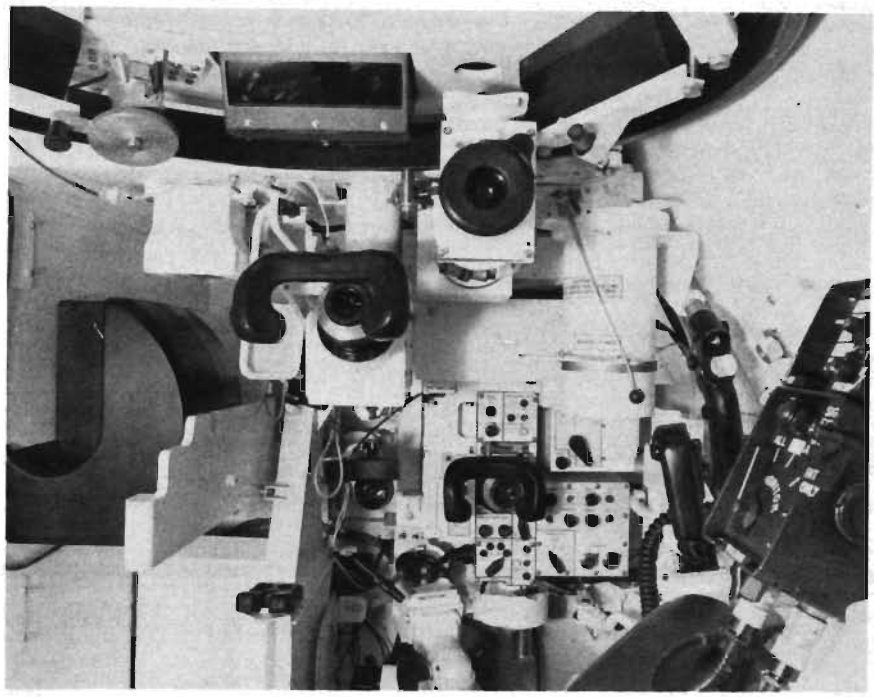
Integrate UCOFT. As powerful a tool as UCOFT is, it still won't solve all your training problems. Use UCOFT most for what it does best — advanced tank commander/gunner practice in target engagement. Do NOT waste UCOFT time by placing crews on it who don't know basic fire commands and crew duties. DO follow-up UCOFT sessions with training sessions using other devices or the tank itself to work on identified skill weaknesses — such as target hand-off, tracking, range estimation — and to prepare for upcoming UCOFT sessions. DO use full crew training exercises over actual terrain to integrate the tank commander/gunner team with the loader and driver. DO integrate gunnery and tactical training at all levels.

Intense initial training. What you don't want is the "greased pole" effect, i.e., a situation where crews build up skill on UCOFT only to lose these skills (slide back down the pole) before their next UCOFT training session. Your crews will require a period of concentrated UCOFT training to adjust to the device and to build their skills to a level that assures retention, especially in certain "problem areas", such as NBC, moving, and manual mode engagements.

Examples of UCOFT Training

Situation 1: UCOFT has arrived. Gunnery is in 6 weeks.

Action: Gunnery is in 6 weeks! Are you kidding? The best thing you can do to prepare for gunnery is to continue the training program which is already peaking in your unit. But you can start now with UCOFT to establish a solid base for year-round gunnery training.



UCOFT mockup of turret interior makes the average US tank crew feel right at home.

Shake loose your key trainers for the UCOFT Instructor/Operator Course (2 weeks). The course will provide intense practice in training the hardest skills in target engagement, as well as time firing from the new UCOFT crew station. Then begin a concentrated UCOFT gunnery training period for leaders (10 hours per person, at a rate of 2 hours per day for 5 days). Once leader training is complete, select a platoon to start an initial training cycle for your unit. (See Situation 3).

Situation 2: UCOFT arrives. Gunnery is in 12-13 weeks.

Action:

Option 1: If you know that your crews must have a "crash course" in gunnery and you want to use UCOFT to do it, 12-13 weeks is the minimum time you'll need. Allow 2 weeks to train Instructor/Operators. The remaining 10-11 weeks can then be used to give each crew in the battalion a total of 6-7 hours of UCOFT training. In this time, each crew will fire a set of 12-15 UCOFT exercises selected to train most target engagement situations in Table VIIIA and VIIIB.

Problems: This approach assumes that you can juggle battalion requirements to keep crews on the UCOFT 10 hours a day, 5 days per week, for 10 weeks. It assumes that you can do this while integrating UCOFT training with full-crew training, including TCPC, dry fire/subcaliber, procedural task training (e.g. boresight and calibrate), tactical tables, and live fire Table VII. Finally, this option assumes that you are willing to choose the short term gain of a "crash course," with its attendant disadvantages: the gradual, planned UCOFT train-up of your unit will be delayed, and the crews trained on the advanced UCOFT exercises may not possess the prerequisite skills they need to train effectively.

Advantages: You will quickly see the level of gunnery proficiency of your crews as they attempt the challenging UCOFT engagements — you'll know the size of the training problem. You will also be able to identify your best (and worst) commanders, gunners and commander/gunner teams. The crews will encounter training under *stress* sufficient to test their attitudes and discipline. The crews will resolve crew coordination and compatibility problems before they get on the range. Finally, the crews will improve their proficiency on Table VIIIA and Table VIIIB tasks.

Option 2: If the crews in your battalion are already making solid progress through a well-planned gunnery training program, we recommend that you continue the program, but begin a long-term UCOFT training cycle for your unit (see Situation 3).

Situation 3: UCOFT arrives. Gunnery is in 16 weeks or longer.

Action: In this situation, begin a long-term integration of UCOFT into your gunnery training. Complete instructor/operator training and leader training. While this is occuring, select five crews to start the initial UCOFT training phase. Ensure these five crews receive training on fire commands and crew duties. Check for eye problems or attitude/compatibility problems — any distractors that will waste UCOFT training time. Schedule these five crews for five 10-hour days on UCOFT —each crew to be in the crew station for 2 hours per day. As noted above, the idea is to avoid the "greased pole" effect. It's important to encourage excellence through competition, here and at all points in the training program, so crews learn as much as possible in each training session. After the first five crews have completed initial training, schedule the next five crews, etc. After 3-4 weeks, you'll need to schedule sustainment training of the crews who have completed the initial training phase. A minimum of 2 hours per 2½ to 3½ weeks per crew is recommended for sustainment training. Crews who are having particular difficulty may need two 1-hour sessions once a week.

As gunnery approaches, you again have the option of interrupting your long-term training for a 10-week "train-up." This is not recommended, however, since one of the purposes of UCOFT training is to develop a year-long gunnery program that builds skills logically to avoid the sharp proficiency peaks (and subsequent declines) of the past.

As already noted, other types of UCOFT training will be a part of the unit training strategy, but at a lower priority:

19K Skill Sustainment. There are Armor officers, NCOs and EM in a battalion who are not assigned to a tank crew. These soldiers should receive the same initial and sustainment training program outlined above, but should be scheduled behind unit leaders and assigned tank crews.

Cross-Training. To the extent that time allows, UCOFT cross-training (gunners and tank commanders) must be scheduled. As an initial planning figure, estimate 2 hours quarterly per gunner and 4 hours quarterly per loader and driver.

Transition Training. Personnel transitioning to the *M1* tank can use the UCOFT as part of their transition training. UCOFT transition training should start with a 10-hour initial period of frequent practice. This should be followed by UCOFT sustainment train-

"...The Cadillac of armor simulation is arriving...

Group 1
Stationary own vehicle, stationary targets (tanks)

Group 2
Stationary own vehicle, stationary targets

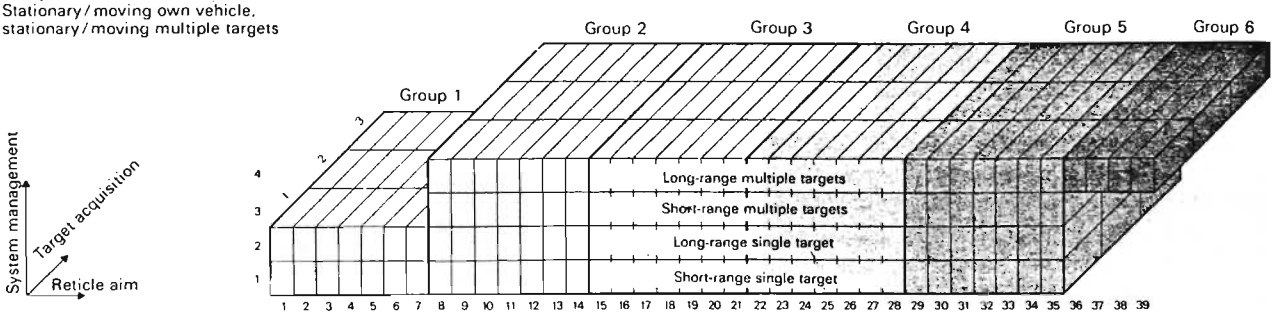
Group 3
Stationary own vehicle, moving targets

Group 4
Moving own vehicle, stationary targets

Group 5
Moving own vehicle, moving targets

Group 6
Stationary/moving own vehicle, stationary/moving multiple targets

Reticle Aim Difficulty	Target acquisition 1	2	3
1	Sight: GPS Visibility: Day/Unlimited Mode: Normal/Precision Malf: None Distractions: None	Sight: GPS Visibility: Dawn/Dusk Mode: Normal/Precision Malf: None Distractions: None	Sight: GPS Visibility: Day/Limited Mode: Normal/Precision Malf: None Distractions: Friendly and enemy fire; friendly vehicles
7	Sight: GAS Visibility: Day/Unlimited Mode: Manual/Battlesight Malf: GPS; computer; LRF; STAB; control handles Distractions: None	Sight: GAS Visibility: Dawn/Dusk Mode: Manual/Battlesight Malf: GPS; computer; LRF; STAB; control handles Distractions: None	Sight: GAS Visibility: Day/Limited Mode: Manual/Battlesight Malf: GPS; computer; LRF; STAB; control handles Distractions: Friendly and enemy fire; friendly vehicles



Matrix chart illlustrates progressive nature of UCOFT exercises, gradually increasing in difficulty and complexity.

ing as already described. UCOFT training must be combined with on-vehicle training of tasks which cannot be trained on UCOFT.

Basic Gunnery Training. The lowest priority of UCOFT training will be training of non-Armor personnel (cooks, mechanics, etc.) so they can serve as battlefield replacements. For these personnel, a 5-hour initial UCOFT training period is recommended. It should be scheduled within the first 1-3 months after arrival of these personnel in the unit. This should be followed by a minimum of 1 hour UCOFT training per month, in combination with other types of training (e.g. crew drills, other devices, training with sight reticle handbooks).

User Concerns Addressed. As UCOFT fielding nears, a number of concerns are being expressed by commanders in the field. Some of those concerns are addressed here.

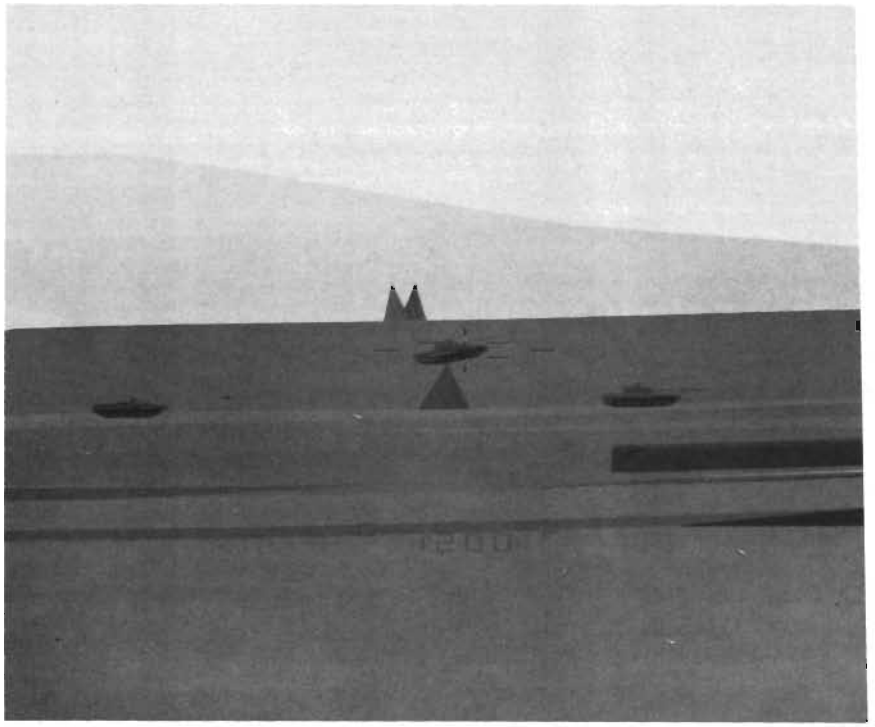
One of the most often asked questions is, "Who trains the UCOFT instructor/operators (I/Os) and how do we maintain their proficiency?" The UCOFT was designed to be used by soldiers. It is another way to teach gunnery — a tool — as any other device or, for that matter, the tank is used. It is only sophisticated in the way it works internally — not the way you make it work. Upon initial receipt of the UCOFT in a unit, the contractor will present a 2-week I/O course to 12 battalion NCOs and/or officers. Six months later, another 2-week course for 12 additional personnel will be presented by the contractor, and every 18 months, at brigade level, the same 2-week course will be offered. Also, each unit will be provided a complete set of course materials to use for training new or additional personnel as unit needs demand.

An important point to be made here is that we are sensitive to the "operator" issue and the concerns being expressed by FORSCOM and USAREUR regarding not only UCOFT, but other simulation systems scheduled for fielding during the next 5 years. The need for a civilian (or somebody other than a battalion asset) as a training simulator operator/maintainer/manager in Armor battalions is being thoroughly investigated. This individual would work with the battalion S-3 and master gunner to coordinate, schedule, and to some degree, operate the battalion's training systems.

UCOFT usage in the unit is driven today by two major factors — realities of time available to train on the UCOFT (given other unit tasks and missions) and the cost of contractor provided maintenance support. Under the present maintenance contract, the UCOFT can be used for training with an expectation of Field Service Representative (FSR) support, 10 hours a day for 5 consecutive days. Recognize that the UCOFT was designed and built for 16-hour a day operation, but the factors mentioned above dictated a 10-hour operational day, and that's the concept under which UCOFT is being fielded. Changes can be made, but let's field UCOFT, obtain actual use factors and good solid estimates of additional usage, if required, before we spend millions of dollars for logistics support we may not need.

UCOFT maintenance will *not* be a headache for the unit. Contractor Field Service Representatives (FSR) will conduct weekly preventative maintenance checks and services on the

. . .and you've got the keys. . ."



The images seen by the gunner and tank commander look like this. Note difference between tank, right, and IFV, at left.

UCOFT and be available for emergency repairs when needed. At the unit level, the instructor/operators (I/O) (the platoon sergeants, master gunner and platoon leaders) are only responsible for general housecleaning chores, light bulb replacement and limited circuit board replacement. Don't let the idea of a soldier going into a computer and replacing circuit boards scare you. Each I/O in the battalion will be given a two-week training course on how to operate and maintain the UCOFT. Using the UCOFT built-in test program and diagnostic routine makes replacing a circuit board almost as simple and as easy as replacing a fuse in your automobile. For any other maintenance or repair actions, the FSR is called.

A final but very important point must be made. The UCOFT is not a panacea for gunnery training. It ties together and enhances individual and team skills and knowledges of the tank commander and gunner, but complete crew interaction must be achieved via other means. Additionally, the UCOFT does not replicate Tank Table VIII tasks on a "by engagement" basis — it was never intended to. It goes far beyond that. Embedded within the training exercises are the tasks, conditions and skills required to sustain, in fact, improve proficiency well beyond the point of Tank Table VIII, through the use of multiple target arrays and diverse gunnery conditions.

Summary. After months of testing, we know the UCOFT is a tool of proven effectiveness in training and sustaining target engagement proficiency of tank commanders and gunners. Built into the UCOFT hardware is a powerful, adaptive, skill-progressive training system. Use the UCOFT system as it is designed to be used. Set up your unit training program with a combination of *motivation* (encourage excellence, competition, fun), *good sense* (insist on trained instructor/operators, manage use and maintenance of the UCOFT), *flexibility* (prioritize and control the type of UCOFT training you want to do — who gets what when), and *imagination* (UCOFT tournament? a UCOFT CAT?) The Cadillac of Armor training simulation is arriving — and you've got the keys!

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Training Future Commanders

The question of the position and role that the future commander must assume within the complex military organizations that characterize our modern armed forces is one of the most frequently discussed of today's topics, although a definitive answer is yet to be found. Indeed, there is probably no single optimal solution; but there may be general principles that we can address and which may be refined as necessary to apply to specific contingencies.

The crux of the issue concerns the most appropriate definition of officer *professionalism* and all the present-day implications of this important concept.

The rapid technological advances in modern weapon systems and the ever-increasing difficulties inherent to managing the highly complex organization of a modern army have produced substantial changes in the perception of the role of today's commissioned officer.

Increasingly, officers must make use of modern managerial techniques and computers in the performance of their peacetime missions. However, in the event of sudden crisis or conflict, they will often be called upon to lead their subordinates by making sound, split-second decisions without recourse to these adjuncts.

Furthermore, while today's officer must display a thorough understanding of expensive and technologically sophisticated weapon systems and have the ability to deploy them effectively, it is becoming even more critical that he acquire a mature and balanced sensitivity toward the noncommissioned officers and soldiers serving under him — the men who operate those weapon systems every day.

The modern soldier is often very much *in step* with the society from which he comes. He is, first of all, an integral part of the national social fabric. Consequently, he displays a keen interest and concern for contemporary issues. Therefore, the role of commander is no longer so much that of the instructor or educator, it has become more closely related to that of the interlocutor with whom ideas and opinions are often exchanged.

Yet, the officer must be capable of responding decisively to those situations of crisis or combat which are the specific province of military organizations. He must be able to lead men into combat — into situations that involve the risk of death and the exigency of killing other men. Such situations require not bloodless, detached programmers or planners in the managerial tradition, not intellectuals who can discuss current events, but true leaders who can inspire confidence in themselves in highly stressful situations.

We are faced with two contrasting models of officer leadership: the bureaucratic professional manager on one hand, the charismatic warrior-leader or condottiere[1] on the other. Which of the two is the appropriate model of officer professionalism, and which should provide the bearings for educating and training tomorrow's commanders?

Let us begin by emphasizing that it is more accurate to speak of a balanced integration of the two approaches, rather than of two contrary ideas. Today's professional soldier can never be simply a manager in the mold of those in the business world. However, in today's complex and highly-structured armies, there is an obvious need for commanders capable of directing and coordinating their assets through the use of up-to-date management techniques.

In an article in the December 1980 issue of *Parameters* magazine, General Maxwell D. Taylor wrote: "an ideal officer is one who can be relied upon to carry out all assigned tasks and missions and, in doing so, get the most from his available resources with minimum loss and waste. Such resources might include men, money, weapons, equipment, allies, time, space, geography and weather."[2] Undoubtedly, a familiarity with sound management principles is essential in order for one to use all these assets in the most efficient and effective manner. However, we now present two important considerations.

First, among all the assets available to a leader, his human assets are by far the most essential. Men must be managed, but only to the extent that one can ascertain for them the most appropriate task or assignment in relation to their particular attitudes and previous experiences. But there is more to it than that. The commander must be capable of perceiving the motivations, interests, ambitions, frustrations, passions, fears and other sentiments that determine the behavior of his subordinates.

In essence, he must know how to understand, recognize and interpret the full range of their emotions, learning how to elicit, orient, or contain all their probable and possible reactions. All this goes far beyond the management of personnel through use of even the most advanced managerial techniques; it involves maintaining with one's own men a close and continuous contact with the ultimate purpose of attaining a thorough and sensitive understanding of them. It is in this way that the officer must win the respect of his soldiers: by sharing their day-to-day toils, privations and rewards. Respect, today more than ever before, cannot depend solely on rank. While the officer's authority to issue orders is based on a legal mandate, it cannot be separated from the demonstrated technical proficiency, human understanding, authoritativeness and trust in subordinates that his soldiers have a right to expect from him. Otherwise, command would depend exclusively on the presence of external symbols — of rank insignia — and thus would be devoid of all substance and significance.

The second consideration concerns the management of the other resources: weapons, money, etc. Here it should be emphasized that the extent to which these assets can be programmed, managed and allocated is determined and qualified in large part by the resulting implications on per-

sonnel. Ideally, one programs, plans and directs the use of materiel resources only in order to provide his subordinates the necessary means to accomplish their mission; accordingly, the way that a commander manages *things* has a direct and important effect on the behavior and performance of the *people* working for him.

It is valid here to observe that, unlike many other important positions of responsibility in our society, the function of the military officer encompasses the role of the *leader* as well as of the *manager*. A convergence of these apparently opposing tendencies is essential, for the officer must be able to face each day the challenges and responsibilities of both roles.

For the very reasons outlined above, today's officer must have a profound understanding of man and of human behavior. General Omar N. Bradley once wrote that the greatest tactical commander in the world would never be able to win a battle without knowing the men that he must lead.

The importance of this aspect of officer professionalism simply cannot be overestimated. A real understanding of the individual soldier and of how the soldier might behave in various situations is, in the final analysis, the determining factor — whether we are speaking of activities that are managerial or, most critically, of those combat situations in which the officer must lead his men under conditions of intense emotional and mental pressure.

We may, therefore, generally identify three distinct components that together must form the cultural makeup of today's officer:

First. A base of technical-scientific instruction necessary for attaining acceptable levels of familiarity and proficiency with the appropriate weapon systems.

Second. A background of instruction in the applicable portions of disciplines drawn from the humanities and social sciences; i.e., history, psychology, sociology, philosophy, political science, economics, that would contribute to a richer understanding of man and his multiple dimensions and experiences.

Third. A managerial component that would provide the officer with the intellectual tools required to work effectively and efficiently with the wide range of resources at his disposal.

Three different aspects of our culture are represented here. Included in the right amounts, and tailored to correspond to the levels of career progression and to the various job assignments of today's officers, they would contribute not only to the professional enrichment of the officer corps, but to a more effective accomplishment of unit missions and organizational objectives at all levels as well.

Nevertheless, something should be said about the considerable difficulties connected with an attempt to realize a program of studies that would address each of the above components. We must not forget that the traditional disciplines of military science also form an integral part of the knowledge with which the future commander will be expected to be conversant.

Although we mentioned the need to introduce the humanities and social sciences, the subjects must be chosen prudently. Examples for inclusion are the psychological theories of needs, and of their effects on motivation (one thinks immediately of Maslow's "hierarchy"), and the sociological intrepretations of organizational or mass behavior, to name only two. In any case, the determining criteria is not that officers should become amateur psychologists or sociologists, but that they are provided with the intellectual tools they need to better understand their own soldiers.

Furthermore, it should be emphasized that technical, social or humanistic and managerial studies need not always be included simultaneously in the various stages of officer schooling. Rather, they should be tailored according to duties, assignments and rank — in short, according to the direction of each officer's career pattern.

Under the broad outlines of this pattern we may generally state that the initial assignments (at least for combat arms officers) are characterized by two basic challenges:

First. The need to become technically and tactically proficient — the need to become thoroughly familiar with the weapon systems at one's disposal and to be able to employ them effectively.

Second. The need to know and understand one's soldiers in order to be able to lead them successfully in the accomplishment of assigned missions.

During the schooling received in the initial phase of an officer's career there is little reason to delve into the intricacies of the managerial sciences.

When an officer attains field grade, he or she can expect to be confronted with the need to plan, allocate and coordinate resources on a large scale — especially as the scope of one's responsibilities changes from homogenous units to combined arms units that include extensive combat support assets. In this phase it is not as necessary to have a detailed, technical knowledge of individual weapon systems, and while the problems and challenges of leading men at higher levels of command remain, the levels of maturity and experience gained by an officer who has attained field grade should permit him to more easily meet these challenges.

At higher levels of schooling, therefore, the social sciences and humanities content of the curricula can be reduced and the managerial content should be increased.

To translate these ideas on officer education and training into practical terms is not easy. It is imperative that the entire cycle of officer schooling be subject to a dynamic and continual process of re-evaluation, adaptation and improvement, so that it meets ever-changing demands and requirements.

The above does not pretend to establish a definitive solution to the problem of how officers should be trained. The issue is extremely complex and delicate and, as stated earlier, there can be no single solution. Rather, the search for the right system of officer education and training is bound to be a continuous one. In any case, we can summarize by re-emphasizing the final purpose of the entire process of officer education and training:

Modern armies need commanders who will be imbued with the traditional virtues and leadership abilities that are in the best tradition of the condottiere and who are also able to manage complex organizational structures. Just as importantly, they must be able to stay abreast of and recognize important social developments and trends.

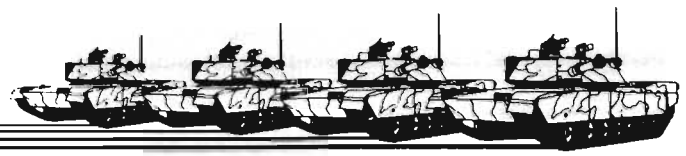
Certainly the issue remains quite open and subject to further development. Suggestions, other views — even criticisms, are not only welcome, but constitute the essential catalyzing elements for a healthy process of re-evaluation and gradual improvement in the training of future commanders.

Footnotes

[1] *Condottiere*: a leader of any one of several mercenary bands of soldiers employed by many Italian city-states during the 14th and 15th centuries. They were essentially adventurers and soldiers of fortune, several of whom were lionized and romanticized by their contemporaries.

[2] Maxwell D. Taylor, "A Do-It-Yourself Professional Code for the Military," *Parameters*, Vol. X, No. 4, December 1980, p. 11.

MASSIMO DAL PIAZ
Lieutenant Colonel, Armor
Italian Liaison Officer, Ft. Knox



Tracks or Wheels for Light Armor?

There appears to be a raging debate within the Army and between the Army and the Marine Corps about the concept of light armor. From my exposure to the subject, it appears to be about small, tracked vehicles (the Army's preference), or 8 x 8 wheeled vehicles (the Marines' choice in the form of the Light Assault Vehicle (LAV)), armed with a main gun whose bore is 90-mm or less. The idea is to give a light force some mobile, antiarmor, nonmissile firepower that is easily transportable by fixed-wing aircraft or heavy lift helicopters. Sounds like an admirable goal to me.

Why, then, the debates? Let's look at the intra-Army debate first. We currently have tanks with 105-mm guns (*M48A5, M60* series and the *M1*) and the 152-mm *Shillelagh* on the 82d Airborne Division's *Sheridans*. The next smaller armored vehicle-mounted antiarmor weapon is the 25-mm Bushmaster on the *M2/M3* vehicles. The *AH-64* carries a 30-mm Chain Gun that could be retrofitted to the *M2/M3* if the need arose. There are several light antiarmor cannons in production that fall between 30-mm and 105-mm. Among them are the Cockerill 90-mm system, the ARES 75-mm dual-feed autocannon and the Israel Military Industries (IMI) 60-mm system. Each system can be mounted on a light armored vehicle and has an existing array of rounds. The preference in our armor branch seems to be none of the above: but it's gotta be on a tracked chassis. Other branches either don't care about the chassis, or lean towards a wheeled system, based on speed and maintenance/life cycle costs.

It is patently obvious that any Soviet-style force will have light armored vehicles in its TO&E, even if the force is airborne or airmobile. If you had a situation where both the U.S. and Soviet armies inserted airborne forces into sub-Sahara Africa, for example, and neither side attacked the other's transports in flight, the 82d would be terribly overmatched by a single Soviet airborne regiment with its organic equipment. The U.S. would be dependent upon tactical air support and attack helicopters for most of its antiarmor support. The Soviets would match those efforts and still have an armored force on the ground. The mobility factor alone threatens any light infantry force, since it can be sliced up by faster moving forces that can get the needed force ratios concentrated at a single point.

Current man-portable antiarmor weapons are inadequate because of rate of fire and launcher density in a light force. If a multi-shot, man-portable, medium-to-long range, dual-purpose system were issued to each squad and platoon, then you can negate some of the Soviet firepower and protection. But mobility still remains a problem. Lack of mobility means relying on other means to influence a battle. If those other means are degraded by combat — or you don't have enough to begin with, you invite defeat in detail.

But the Army appears to be wedded to a tracked system that hasn't been tested yet. Despite all the talk about light armor, has the Army formally tested any tracked or wheeled designs? I have not read of any such tests. The AAI Corporation's RDF/LT vehicle with the 75-mm ARES dual-purpose (antiarmor/antihelicopter) automatic cannon would be an interesting candidate. How about an *M3* with that system? Or an *M113A2* with the IMI 60-mm gun? The Army owes its troops to provide them with the needed mobility and protection in non-urban areas. You might rely on the Fast Attack Vehicles (FAVs) being tested at Ft. Lewis, WA, but they lack the heavy, nonmissile firepower needed in open areas and aren't all that amphibious, either. But the bias appears to be toward tracks, and I doubt that many of the tracks considered are amphibious. Whatever the Army finally decides to use, they will have to give up something to fund it. I shudder to think what will be cut and what will *not* be cut.

The Marines have purchased the LAV and are more than a little ticked off at the Army's withdrawing from the program. The LAV gives the Corps a basic vehicle capable of amphibious movement, airportability and speed. Variants of the basic LAV mean that commonality is high, which reduces logistical problems, and less worries for maintenance personnel. The LAV means that a battalion of such vehicles is capable of making a rapid link-up with other forces inserted deeper into enemy territory.

As an artilleryman with more than a little fondness for SP howitzers, I like tracks. But if I were offered the British light howitzer with the 17 km range mounted on an amphibious, protected wheeled vehicle with a total weight under 15 tons, I would snap up a reinforced battalion very quickly.

The Army still has no system (wheeled or tracked) that can be used with the Rapid Deployment Force that offers a modicum of antiarmor capability. By using an existing weapon system on an LAV variant, you can get wheeled vehicles with guns ranging from 60-mm (IMI) through 75-mm (ARES) to 90-mm (Cockerill) and 105-mm (MOWAG *Shark*.) With autoloading and rapid fire capabilites, the 60-mm and 75-mm system also have a decent anti-helicopter capability without having to increase the ADA assets. Smaller rounds mean more can be carried per vehicle (the 5.56-mm vs 7.62-mm argument, this time with cannon) and mobility remains high due to the wheels.

A platoon-size element consisting of three LAVs with the 60-mm or 75-mm gun system, 3 LAVs with the 25-mm gun and twin *TOW*, carrying three or four-man portable systems described in the letter, "Nuclear Flaw in AirLand Battle" in the May-June 1984 ARMOR, with one more LAV as the command control vehicle, perhaps with a *Sgt. York* radar, would be a great asset to any battalion. It would require one *C-5A* to carry this platoon's vehicles, any trailers for ammunition and supplies, and supplies personnel. A cannon LAV and an AT squad LAV would be a team that could reinforce a company or

back up the scouts. Another platoon at brigade headquarters could be a mobile brigade AT force. A company at division would give the division commander his own AT force that could greatly influence a battle.

To me, it is obvious that some sort of light armor is needed to add mobility and firepower to light forces. They don't need to slug it out with heavy armor forces, but they must be able to complement the AT missile force and add direct-fire capabilities against other light forces and helicopters. My preference is a 60-mm or 75-mm auto loading, dual-purpose cannon on an amphibious 8 x 8 light, armored vehicle. This gives speed, mobility, endurance, lower maintenance and life cycle costs with good air transportability. The system exists; do we want to mate them for testing or do we study the program and problems until a unit is cut to pieces in combat?

By buying the LAV series, along with the Marines, both services save money and get what they need.

LARRY A. ALTERSITZ
Major, Field Artillery
NJARNG

Our Tanks Need Missiles, Too

Since the demise of the *M551 Sheridan* Armored Reconnaissance Vehicle and the *M60E2* main battle tank, the Armor community has been reluctant to arm tanks with guided missiles. The arguments are often filled with heated emotionalism and punctuated with horror stories of "personal experiences", many of which have been passed on to succeeding generations of junior officers. In spite of this strong prejudice, the Army should reconsider the issue of placing missiles on tanks to determine if new capabilities, coupled with old lessons learned, would enhance the U.S. Army's heavy forces.

The benefits and capabilities of the *Shillelagh* missile system are often overlooked because of misunderstanding and hearsay evidence. While this is not my topic here, an individual's historical perspective greatly influences his ability to rationally discuss this subject. But a key point to remember is that the *Shillelagh's* beam rider technology has been developing since 1958. This system provided a high hit probability and a warhead defeat capability equal to or greater than that of the *TOW* missile.

Many of the reliability problems associated with the *M551* and the *M60E2* were automotive in nature. The impulse loading of the system caused by firing the HEAT-MP companion round and the state-of-the-art of the shock hardening of missile control boxes within the vehicle contributed significantly to reliability problems in the missile system or vehicle electronics. But this technology was state-of-the-art 25 years ago. Technological solutions to the reliability "bugs" have now matured. It should be noted that recently, during a 20-year surveillance test of 15 *Shillelagh* missiles, the functioning rate was still excellent, scoring 15 of 15. So, from a historical perspective, we have demonstrated the capability to design and develop missiles for tanks. The increasing use of missile systems on other battlefield carriers, from *Bradley* Fighting Vehicles to helicopters, proves our maturity in integrating these systems into fighting platforms. The engineering challenge remaining is to integrate these missile systems on a tank.

There are three basic reasons for reconsidering missile armament for tanks: to counter an increasing threat, to avoid losing our capital investment in 105-mm-equipped tanks through obsolescence, and to provide a significant advantage in the tank-antitank role. Since these goals are not mutually exclusive, a missile system must be examined to determine how well it can fulfill these three objectives.

The days of an unsophisticated Soviet armor threat are gone forever. In recent decades, the Soviet tank fleet has continually grown in size and capability. More sophisticated fire control features have eroded the probability-of-hit standoff advantage U.S. tanks once enjoyed. Soviet employment of larger tank cannons, now in the 125-mm range, provides increased lethality at greater range. As a result of these improvements, tanks will no longer have to be close to the WWII standards of 800 meters to be capable of acquiring, hitting and penetrating their targets. Commanders provided the luxury of highly accurate and lethal systems can employ these systems at locations which optimize their long-range capability. It should be expected that tank battles can, and will, occur at ranges from muzzle to 3km and beyond. Many computer tank battle scenarios conducted at the Directorate of Combat Developments at Fort Knox indicate that U.S. tank forces need to initiate engagements at ranges in excess of 2,400 meters and break off engagement when the range closes to within 1,200 meters if they are to avoid decisive engagement against numerically superior forces. To obtain this standoff, a necessity in tank battles of attrition, the U.S. must develop a longer range capability.

Obtaining a long-range advantage, or standoff, is not possible with cannon/munition technology. Our current antitank munitions rely on kinetic energy to defeat armor targets. The ability to package enough mass in the penetrator and accelerate it to adequate velocities, the role of the propellant, becomes limited by cartridge size and volume available. Additionally, as penetrator velocity decreases over range (because of drag and other factors), the round is less able to penetrate and defeat targets, hence the effective range is reduced.

A second limitation is that present "fire-and-forget" rounds depend on sophisticated fire control solutions to hit targets: As neither side possesses a great edge in technology,

the range standoffs provided by fire control are now relatively equal. The coupling of fire control performance (probability of hit) with munition performance (probability of kill, given a hit) indicate significantly reduced capability for either force at ranges greater than 2 kilometers.

This situation can be overcome by the application of missile technology to the tank itself. Engineering analysis indicates that tank-fired missile systems can achieve better than a 50-percent probability of kill given a shot (Pks) at all ranges of acquisition. This margin of performance, when compared to the ever-decreasing Pks of conventional munitions, provides a significantly increased loss-exchange ratio because of the greater standoff.

Avoiding obsolescence of our current fleet is a second benefit. The *M60*-series tanks, and even a majority of the *M1* fleet, will be equipped with the 105-mm cannon well into the year 2000.

Many of the limitations of long-range performance also apply to the armor-defeating capability of the 105-mm cannon. Advancements in armor have also taxed the defeat capability of munitions. This has led to the demise of the HEAT round as a prime antitank cartridge. The capability of a HEAT round is in direct relationship to its cone diameter and standoff. Penetrating modern armor requires a cone diameter beyond 105-mm or even 120-mm. For some time, kinetic energy munitions have provided an answer, but the limitations of chamber volume and cartridge length continue to restrict even KE performance. The limitations of barrel diameter and fixed chamber size, when pitted against dynamic protection technology, will lead to obsolescence of any cannon system. In the case of 105-mm-equipped systems, this may be on the brink of happening. However, two generic missile systems, either through-the-tube or strap-on systems, may preclude or delay this event.

Recent efforts in classified technology have shown how many of the modern protection systems can be finessed without having to follow the historical solution of increasing projectile diameter. Although not applicable to cannon-fired projectiles because of exterior and interior ballistic considerations, the incorporation of these technologies would allow a through-the-tube missile to defeat Threat tanks. This alternative, probably most attractive to the user, would result in a missile system which would appear to the tanker as just another bullet. This system, providing a high probability of kill given a shot, would both increase standoff and prevent the obsolescence of the fleet.

Even a strap-on system would have significant advantages. Because missile diameter would not have to be limited to gun tube diameter, the design can have growth potential. External mounting with quick disconnects would allow attachment to any tank, either 105-mm or 120-mm, and could be applied as the tactical situation dictates. Such a system could also provide such benefits as fire-and-forget convenience, top attack capability, and the possibility of firing from turret defilade. These options, coupled with the high probability of hit and kill, would give us a system that stretches the effective life of the current tank fleet, provides long-range engagements of the other roles of the tank's direct-fire cannon.

Obviously, there is no perfect missile solution, either through-the-tube or strap-on, but further analysis can provide the optimum solution. However, even with their limitations, missiles are probably the only way the 105-mm equipped tanks can avoid obsolescence.

The final reason for considering missiles is to provide a significant advantage in the tank/antitank role. Current doctrine calls for other than tank systems to provide long-range antitank capability, usually missiles on lightly armored systems such as helicopters and infantry fighting vehicles. The advantages of the helicopter are obvious, its greater mobility and altitude which improve target acquisition. But once the enemy force closes to within range of Soviet direct-fire cannon, these lightly armored systems will have to withdraw or be killed. As these systems are attrited or withdrawn, the U.S. force will be left with only the relatively short range tank cannons against a force with superior numbers, firepower, and standoff. The tank was created to provide a protected weapon system to retain mobility on the battlefield. Failing to provide significant armor protection to the most lethal weapon on the battlefield, the missile, invites the destruction of these systems without reaping their benefits. Placing a missile system under heavy armor as a complementary munition will allow the most versatile subsystem of the force to engage at all ranges, thus either reducing total force requirements or significantly increasing the capability of the force over broader bands of engagement.

There is a place for missiles on a tank. They provide increased standoff, prevent obsolescence in our current systems, and could give us increased force effectiveness. Now we need to define the most advantageous system so that the development cycle can begin.

EARL R. EDMONSON
Major, Armor
Hunstville, AL

Recognition Quiz Answers

1. **KURASSIER II(Austria).** Crew, 3; weight, 17,500 kg (19 tons); maximum road speed, 65 km/h; maximum road range, 520 km; 6-cylinder, turbocharged diesel 320-hp engine; armament, 1 x 105-mm main gun, 1 x 7.62-mm coaxial machinegun.

2. **PBN 302 APC (Sweden).** Crew, 2, plus 10 infantry; weight, 13,500 kg (14 tons); maximum road speed, 66 km/h; maximum water speed, 8 km/h; maximum road range, 300 km; 6-cylinder, turbocharged 280-hp diesel engine; armament, 1 x 20-mm autocannon.

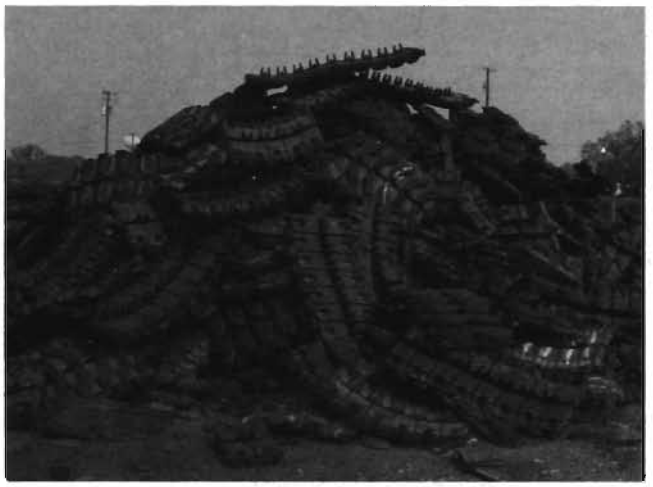
3. **YP408 APC (Neth).** Crew, 2, plus 10 infantry; weight, 12,000 kg (13 tons); maximum road speed, 80 km/h; maximum road range, 500 km; 6-cylinder, turbocharged 165-hp diesel engine; armament, 1 x 12.7-mm machinegun.

4. **FV107 SCIMITAR (UK).** Crew, 3; weight, 7,756 kg (17 tons); maximum road speed, 80.5 km/h; maximum road range, 644 km; 6-cylinder, 190-hp gasoline engine; armament, 1 x 30-mm Rarden cannon, 1 x7.62 machinegun..

5. **BMP-1 (USSR).** Crew, 3 plus 8 infantry; weight 13,500 kg (14 tons); maximum road speed, 80 km/h; maximum water speed, 6-8 km/hr; maximum road range, 500 km; 6-cylinder, 300-hp diesel engine; armament, 1 x 73-mm main gun, 1 x 7.62-mm coaxial machinegun, launcher rails for Sagger missile.

6. **BTR-60PB (USSR).** Crew, 2, plus 14 (max) infantry; weight, 10,300 kg (11 tons); maximum road speed, 80 km/h; maximum water speed, 10 km/h; maximum road range, 500 km; 2 x 6-cylinder gasoline 90-hp engines; armament, 1 x 14.5-mm machinegun, 1 x 7.62-mm coaxial machinegun.

REGIMENTAL REVIEW



From this to this. Shown is a pile of armor vehicle tracks that previously would have been disposed of through the Army property disposal sales program.

Now, the track is being reclaimed at the Red River Army Depot, Texas, with monetary savings said to run into the millions of dollars annually.

Reclaimed Vehicle Tracks Save $$$

Hundreds of tons of previously salvaged vehicle tracks are now being reclaimed at the Red River Army Depot, Texarkana, Texas, creating a savings of more than $5 million. The reclaimed tracks were previously disposed of through Army-wide property disposal programs.

The track recovery program is but one of several money-saving projects now underway at the U.S. Army Depot System Command's (DESCOM) Value Engineering Program. A total of $29.4 million has been saved in FY 1984 with an additional $22.5 million saved in support of the Spare Parts Program, DESCOM officials say.

Preference Data Form is Vital

If you do not have an up-dated Preference Data Form (DA Form 483) in your officer record file at MILPERCEN you could be hurting when it comes to selection time for schools or future assignments.

It is recommended that officers submit a preference statement upon arrival at each new duty station, prior to attending any Officer Advanced Course, or if you are within one year of reassignment. Keep your records up to date!

You may contact the Armor Branch, MILPERCEN, at Autovon 221-9696/9658/6340/6341.

3d ACR Celebrates 138th Year

The 3d Armored Cavalry Regiment celebrated its 138th anniversary on 12 October at Fort Bliss, Texas. Four days of activities marked the event beginning on 9 October with a regimental review and the retirement of the Regimental Standard and the emplacement of a new Standard. The old Standard has been added to the Regimental Museum of ten 3d ACR standards dating back to 1848.

An Aberdeen technician measures penetration and diameter of a hit on armor plate made by an AT4 rocket from the new antiarmor weapon now under test at the Proving Ground in Maryland. The AT4 is said to penetrate 450-mm of armor.

New Antiarmor Weapon Under Test

A potential replacement for the light antiarmor weapons (LAW) now in use by the Army is undergoing extensive testing at the Aberdeen Proving Ground, Maryland.

The AT4, an 84-mm weapon, is of Swedish manufacture and is said to have about three times the effective range of the LAW, a shorter flight time and the ability to penetrate up to 450-mm of rolled homogeneous armor plate.

The AT4 system has demonstrated significant 'after-armor' effects. After penetration, an incendiary gas jet can detonate fuel or ammunition stored inside the vehicle, testers say.

Several hundred rockets will be fired during the test cycles and a decision is expected in August.

Aberdeen technicians mount a 105-mm gun on a test rig prior to proof firing. Elaborate measurements taken during the firing tests establish the gun's safety factors before it is shipped to tank manufacturers.

The ultimate test — a special over-pressure 105-mm round is pushed into the breech of a gun under test. The round will exert internal pressures up to 113 percent over the gun's designed safety factor. After testing, the gun and ancillary mechanisms are stripped down, examined and reassembled to complete the test sequence.

Main Tank Guns Proof-Tested at Aberdeen

Proof-testing main tank guns is a continuing project at the Aberdeen Proving Ground, Md. During the test cycle, 105-mm cannon are received at the Maryland installation, mated with recoil mechanisms, tested with over-pressure rounds and normal pressure rounds, disassembled, visually and electronically checked for flaws, reassembled, painted and shipped to tank manufacturers or tank-rebuild facilities.

Over-pressure rounds exert internal pressures up to 113 percent above the designed pressure limit of the breech. Guns are fired at various elevations to check that the recoil mechanism always returns the gun to battery for reloading.

A special measuring device — an adaptation of the device used by the Germans in WW I to calculate the range and fall of shot of their 'Big Bertha' cannon that shelled Paris from 75 miles away — establishes the internal breech pressures during the proof-testing firing.

New Entry Point For New Tool Ideas

The Army has established a new entry point within the Army Materiel Command to submit new tool ideas or suggestions for minor items of equipment. This is to assist and encourage tool users to submit their suggestions to the Army's maintenance community for evaluation and possible acquisition.

The new screening point is:
Commander
USAMC Materiel Readiness Support Activity (MRSA)
ATTN: AMXMD-MD
Lexington, KY 40511-5101

New ideas may also be sent to MRSA through SMART channels to the following address:
Commander
U.S. Army Logistics Center
ATTN: ATCL-CST (SMART)
Fort Lee, VA 23801-6000

New Improved *M1* Track Pad Under Test

The Materiel Test Directorate at Aberdeen Proving Ground, MD, is currently testing a new type of *M1* rubber track pad that holds promise of greatly increasing the track durability for the 60-ton main battle tank.

Current style track pads are permanently attached to their track shoes and in-service use has disclosed that their wear potential is about half of the hoped-for figure of 2,000 miles between changes.

The new track pad, a replaceable type that, when worn, does not require replacement of the entire pad and shoe assembly, is expected to extend the track wear mileage for the *M1*. Tests include fuel consumption, tracking and braking assessments followed by durability tests in which nine *M1*s will be operated for 6,000 miles, to include main gun firing exercises, to determine the new track pad's effects, if any, on the fire control system.

1-33d Medics & Mortars Shine Out

The intensive summer and fall training periods for the 1st Battalion, 33d Armor, 3d Armored Division have paid off with exemplary results. The battalion medical platoon established a division precedent when 94 percent of its personnel qualified for the Expert Field Medical Badge.

Not to be outdone, the heavy mortar platoon distinguished itself when it qualified as the highest in the entire division. The platoon achieved this honor even though understrength and operating as a maximum 6-gun platoon with two FDCs.

In September, the battalion operated with the Belgian armor forces on "Roaring Lion", an exercise in the Reforger series.

Top Guns Named for 4-68 Armor

Firing HEAT and SABOT rounds, three tanks of the 4-68 Armor were rated tops during a recent shootout at the Fort Carson, Colorado ranges.

Top tanks were from A, B and D companies. The first place tank, from D Company, was crewed by: SSG Larry Turner, tank commander, SP4 Eugene Maze, gunner, SP4 Randy Selby, loader, and SP4 Melvin Brehacek, driver.

B Company's tank came in second. It was crewed by: SGT Baldamar Niduarri, tank commander, SP4 Douglas Welles, gunner, SP4 Reddie Jones, loader, and SP4 Billy Keener, driver.

The top line A Company tank was crewed by: Captain Adimeal Kastro, tank commander, SGT Nathaniel Motley, gunner, SP4 William Jones, loader, and SP4 Lamarr Cook, driver.

Well done!

ABC Class Advisors Sought

Quality officers to serve as Armor Basic Course class advisors are being selected by the Armor Branch, MILPERCEN. Officers selected for this competitive program are assigned to the Armor Center at Fort Knox, Ky, either prior to or after graduation from the Armor Officers Advanced Course.

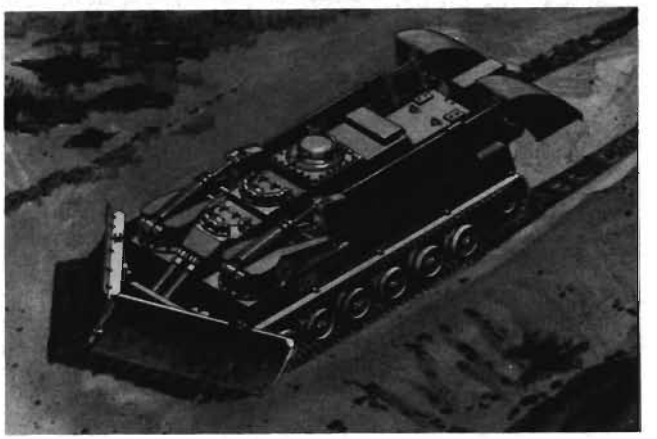
Duties include: coordinating activities, overseeing the student chain of command and providing a role model to the basic course officers.

Requirements are a strong prior performance of duty, successful completion of the Army Physical Readiness Test, height and weight in accordance with Army standards, and a strong motivation.

If you are interested, contact Captain Jerry Ferguson or Mrs. Dorothy Groome at the Armor Branch, MILPERCEN, Autovon 221-9696/9658.

Soldier of the Year

Sergeant Michael D. Hight, HHT, 3d Armored Cavalry Regiment, was selected as the Fort Bliss, Texas, Soldier of the Year. Sergeant Hight, a 19D cavalry scout, is serving with the Regimental S2. He was chosen from over 10,000 soldiers on Fort Bliss. Congratulations, Sergeant Hight!



The counterobstacle vehicle, showing its 'dozer blade, excavating buckets on the rear and other changes to the basic *M88A1* chassis. The vehicle will undergo a six-month test period beginning in July.

Counterobstacle Vehicle Under Test

The Belvoir Research and Development Center Engineer Support Laboratory, in cooperation with the Israeli Defense Force, is developing a unique counterobstacle combat vehicle for engineer use on the battlefield.

The new vehicle combines the functions of earthmoving, countermine and excavating and will enhance the Army's ability to quickly overcome obstacles such as minefields, tank ditches and urban rubble.

The three-man-crew vehicle is based on the *M88A1* armored recovery vehicle with appropriate changes to accomodate the plow and earthmoving systems.

The vehicle will be up-engined from 750 hp to 908 hp and will weigh in the 66-68 ton range versus the *M88A1's* 56 tons.

Master Gunner's Course Rated Tops

Luck no longer plays any part in a tank gunner being able to put steel on target with his first shot.

Training is the answer, and tankers who attend the three-month Master Gunner's Course at Fort Knox, KY. are among the best-trained tank gunners in the world.

It's a tough course with less than two-thirds of any course graduating, according to Master Sergeant Gary Strickland, chief instructor for the Advanced Gunnery Branch at Fort Knox. Students have to maintain a 90 percent average. There are 25 students per class and one instructor is responsible for three students. Many candidates wait more than a year to attend.

The program is geared toward training highly qualified NCOs in all phases of tank gunnery and turret maintenance; moreover, the course teaches them how to train others when they return to their units.

The course forces an already good NCO to become even better, said Strickland.

"In the past two years, more slots have been filled at the Master Gunner's Course by Fort Carson personnel than from anywhere else," said Sergeant First Class Robert Trevorrow, division master gunner.

"In order to pass, you have to be a smart guy," said Trevorrow. "If you aren't on the stick you wash out."

BOOKS

DROP ZONE SICILY: Allied Airborne Strike July 1943, by William B. Breuer. Presidio Press, Novato, CA, 94947. 212 pages. $15.95.

Here is my kind of book, a collection of war stories illustrating the contributions of privates, sergeants, junior officers and senior commanders in the successful assault on Sicily in July, 1943.

Although airborne trooper heroism, both American and British, is highlighted, today's infantry and armor soldiers can find lessons applicable to any future conflict. For instance, how do you fight enemy tanks with no antiarmor weapons?

Does this book tell the whole invasion story? It does not. Accordingly, military and history buffs need to read such related volumes as "Sicily and the Surrender of Italy" (U.S. Army in WW II), "Sicily" by Martin Blumenson (Ballantine's Campaign Book, No. 3), "Still Time to Die" by Jack Belden and "The Spearheaders" by James Altieri to get the full story.

"Drop Zone Sicily" is recommended reading for today's military professional. The stories it tells are valuable to today's soldiers and the lessons they teach may enhance their chances of survival.

ALBERT H. SMITH, JR.,
Major General, USA (Ret.)
Tucson, AZ

THE WORLD WAR II QUIZ & FACT BOOK by Timothy B. Benford. The Berkley Publishing Group, 200 Madison Ave., N.Y., 10016. 240 pages. $3.95 (softback).

Got a question about WW II that you aren't likely to find the answer to in the history book? This one probably has the answer. Most of it is trivia —interesting and quite often informative.

Remember "Kilroy Was Here?" Who started it? This book tells you.

Who was the first member of Congress to enlist after war was declared? You'll never guess.

Who signed Clark Gable's discharge papers? You wouldn't believe it!

Who was the 'ace of aces' in WW II?

What U.S. river's approaches were mined by a German U-boat?

All sorts of things like that. If you're into these kinds of questions to balk your friends with during an evening of 'war stories', then this is the book for you. Lots of fun. And lots of facts.

ARMOR staff

FOLLOW ME: The Human Element in Leadership, by Major General Aubrey "Red" Newman, USA (Ret). Presidio Press, Novato, CA 94947. $9.95. 323 pages (paperback).

General Newman writes about leadership that comes from the head, the heart and the gut. His book is divided into three principal parts: Command Presence, Command Techniques and Command in Battle. Each is written in a clear, readable style.

The third part, Command in Battle, is the most powerful for here General Newman writes from personal experience, saying "The leader must win the battle in his heart, before he walks into the flame of combat."

To win the battle within one's self is the vital part of command and the author says that to achieve this you must: be ready to do what you ask others to do; earn the loyalty of your troops; and by being resolute in battle.

Also covered are such practicalities as organization of the staff and command post for battle, and, sleep and the soldier.

If an officer reads but one book on leadership, it should be this one.

KEVIN C.M. BENSON
Captain, Armor
MILPERCEN

A Basic Reading List

ARMOR Magazine and the U.S. Armor School Library often receive requests for a 'basic reading list for the armor officer and NCO.'

Even a 'basic' reading list to fulfill the needs of these people can become quite lengthy. In response to our request, the Armor School Library has compiled the following list of titles for such a 'basic' list. While not at all total in its coverage, this list will provide a very solid foundation for further professional reading and can be augmented at the reader's convenience.

Author	Title	Publisher
Badri, Hassan El	The Ramadan War, 1973	T.N. Dupuy Associates, VA
Caidin, Martin	The Tigers Are Burning	Hawthorn Books, New York.
Carrell, Paul	The Foxes of the Desert	E.P. Dutton & Co.
Crisp, Robert	Brazen Chariots	W.W. Norton & Co.
Ellis, William D.	Clarke of St. Vith	Dillon/Liederbach, Inc.
Foley, John	The Boilerplate War	Walker & Co.
Fuller, John F.C.	Armored Warfare	Military Service Publishing Co.
Gillie, Mildred H.	Forging the Thunderbolt	Military Service Publishing Co.
Guderian, Heinz	Panzer Leader	E.P. Dutton & Co.
Herzog, Chaim	The War of Atonement	Little, Brown & Co.
Icks, Robert J.	Famous Tank Battles	Doubleday & Co.
Liddell Hart, Basil	The Tanks, Vols I, II	Frederick A. Praeger
Macksey, Kenneth	Tank Warfare	Stein & Day
Mellenthin, F.W.	Panzer Battles	University of Oklahoma
Messenger, Charles	The Blitzkrieg Story	Charles Scribner's Sons
Ogorkiewicz, R.M.	Design and Development of Fighting Vehicles	Doubleday & Co.
Ogorkiewicz, R.M.	Armor: A History of Mechanized Forces	Frederick A. Praeger
Ogorkiewicz, R.M.	Armoured Forces	Arco Publishing Co.
Rommel, Erwin	The Rommel Papers	Harcourt, Brace & Co.
Simpkin, Richard E.	Antitank	Pergamon Press, Inc.
Simpkin, Richard E.	Human Factors in Mechanized Warfare	Pergamon Press, Inc.
Simpkin, Richard E.	Tank Warfare	Pergamon Press, Inc.
Starry, Donn A.	Mounted Combat in Vietnam	Presidio Press
Sweet, John J.T.	Mounting the Threat	Presidio Press
Weeks, John	Men Against Tanks	Mason/Charter
Young, Desmond	Rommel, The Desert Fox	Haper & Bros.

STEEL ON TARGET

At first blush they seemed to be average men standing around the hors d'oeuvre table sipping drinks and snacking. Most were of retirement age with the outward signs that characterize that time of life: faces creased, midriffs slightly bulging, greying and thinning hair. Some were dressed in the well-tailored style of professionals —silk ties, wool pin-striped suits. Others portrayed a worker's dress —an off-the-rack suit or blazer, a clip-on tie. Yet their camaraderie was unmistakable. The secret to their comradeship was found in the insignia on the small lapel pins or belt buckles they wore — the patches of the 16 U.S. armored divisions that fought in WW II.

Forty years after that momentous time in their lives, these men from all walks of life assemble yearly as the Council of Armored Division Associations to perpetuate the memories of those divisions and the deeds they performed in wresting Europe from the Nazi grip.

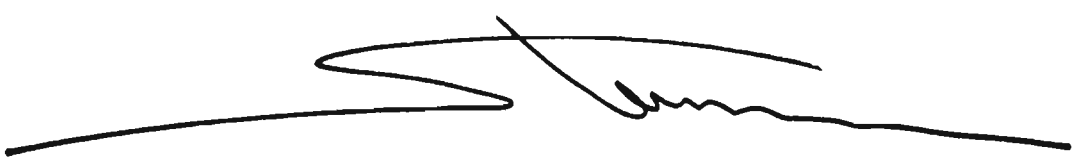
Their pride is evident in their introductions that often include the unit in which they served and fought. Designations no longer in vogue abound — armored field artillery; armored infantry; cavalry reconnaissance squadron mechanized.

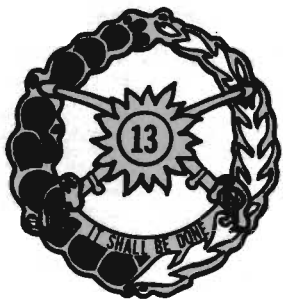
They passionately praise or damn the same personalities or units they worked with in the past. Their war stories ring with the authenticity of men who put it all on the line for themselves and their buddies.

One can't but be impressed by the esprit de corps, unit cohesiveness, morale, and pride in service shown by these men long out of uniform.

As we strive for an Army of Excellence and a Regimental Manning System which fosters these same virtues, we need not look far for a standard against which to measure our efforts. The verdict will come 30 years hence as today's soldiers, grown old, stand around the hors d'oeuvre table with old Army comrades and argue the merits of their regiment.

The passion of our feelings and arguments in the future years will measure the success or failure of our efforts today. Good Shooting!





Symbolism

The regiment was organized in 1901 at Fort Meade, South Dakota, and has served in the Philippines and along the Mexican border. The sun in splendor is taken from the flag of South Dakota; the wreath shows the Philippine and border service.
On the organizational flag the scroll of the regimental badge is omitted and the motto is placed on the scroll in the eagle's beak. This badge is in lieu of a coat of arms.

Distinctive Insignia

The distinctive insignia is the regimental badge.

13th Cavalry

It Shall Be Done

Lineage and Honors

Constituted 2 February 1901 in the Regular Army as 13th Cavalry. Organized 1 May 1901 at Fort Meade, South Dakota. Assigned to 2nd Cavalry Division 1 March 1933—18 August 1936. Reorganized and redesignated 16 September 1936 as 13th Cavalry, Mechanized. Reorganized and redesignated 15 July 1940 as 13th Armored Regiment and assigned to 1st Armored Division.

Regiment broken up 20 July 1944, and its elements reorganized and redesignated as elements of the 1st Armored Division as follows: Headquarters and Headquarters Company, Service Company, and Companies D, E, and F as 13th Tank Battalion; 3rd Battalion and Maintenance Company as 4th Tank Battalion; Reconnaissance Company as Troop D, 81st Cavalry Reconnaissance Squadron, Mechanized; Headquarters and Headquarters Companies, 1st and 2d Battalions, and Companies A, B, and C disbanded.

13th Tank Battalion converted and redesignated 1 May 1946 as 13th Constabulary Squadron; concurrently, relieved from assignment to 1st Armored Division and assigned to 10th Constabulary Regiment. Inactivated 20 September 1947 at Coburg, Germany, and relieved from assignment to 10th Constabulary Regiment. Converted and redesignated 27 February 1951 as 13th Medium Tank Battalion and assigned to 1st Armored Division. Activated 7 March 1951 at Fort Hood, Texas. Reorganized and redesignated 20 May 1953 as 13th Tank Battalion. Inactivated (less Company A) 15 February 1957 at Fort Polk, Louisiana (concurrently, Company A reorganized and redesignated as Headquarters and Headquarters Company, 1st Medium Tank Battalion, 13th Cavalry).

4th Tank Battalion converted and redesignated 1 May 1946 as 72d Constabulary Squadron; concurrently, relieved from assignment to 1st Armored Division and assigned to 10th Constabulary Regiment. Inactivated 20 September 1947 at Boblingen, Germany, and relieved from assignment to 10th Constabulary Regiment. Converted and redesignated 27 February 1951 as 4th Medium Tank Battalion and assigned to 1st Armored Division. Activated 7 March 1951 at Fort Hood, Texas. Reorganized and redesignated 20 May 1953 as 4th Tank Battalion. Inactivated 15 February 1957 at Fort Polk, Louisiana.

Troop D, 81st Cavalry Reconnaissance Squadron, Mechanized, reorganized and redesignated 1 May 1946 as Troop D, 81st Constabulary Squadron; concurrently, relieved from assignment to 1st Armored Division and assigned to 3d Constabulary Regiment. Inactivated 20 September 1947 in Germany, and relieved from assignment to 3d Constabulary Regiment. Redesignated 27 February 1951 as Company D, 81st Reconnaissance Battalion, and assigned to 1st Armored Division. Activated 7 March 1951 at Fort Hood, Texas. Inactivated 15 February 1957 at Fort Polk, Louisiana.

Headquarters and Headquarters Companies, 1st and 2d Battalions, and Companies A, B, and C, 13th Armored Regiment, reconstituted 15 February 1957 in the Regular Army.

13th and 4th Tank Battalions, Company D, 81st Reconnaissance Battalion, and reconstituted elements of the 13th Armored Regiment consolidated, reorganized, and redesignated 15 February 1957 as 13th Cavalry, a parent regiment under the Combat Arms Regimental System; 13th and 4th Tank Battalions and Company D, 81st Reconnaissance Battalion, concurrently relieved from assignment to 1st Armored Division (Headquarters, 13th Tank Battalion concurrently redesignated as Headquarters, 13th Cavalry). Reorganized and redesignated 3 February 1962 as 13th Armor.

Campaign Participation Credit

Mexican Expedition
Mexico 1916-1917

World War II
Algeria-French Morocco (with arrowhead)
Tunisia
Naples-Foggia
Anzio
Rome-Arno
North Apennines
Po Valley

Decorations

None