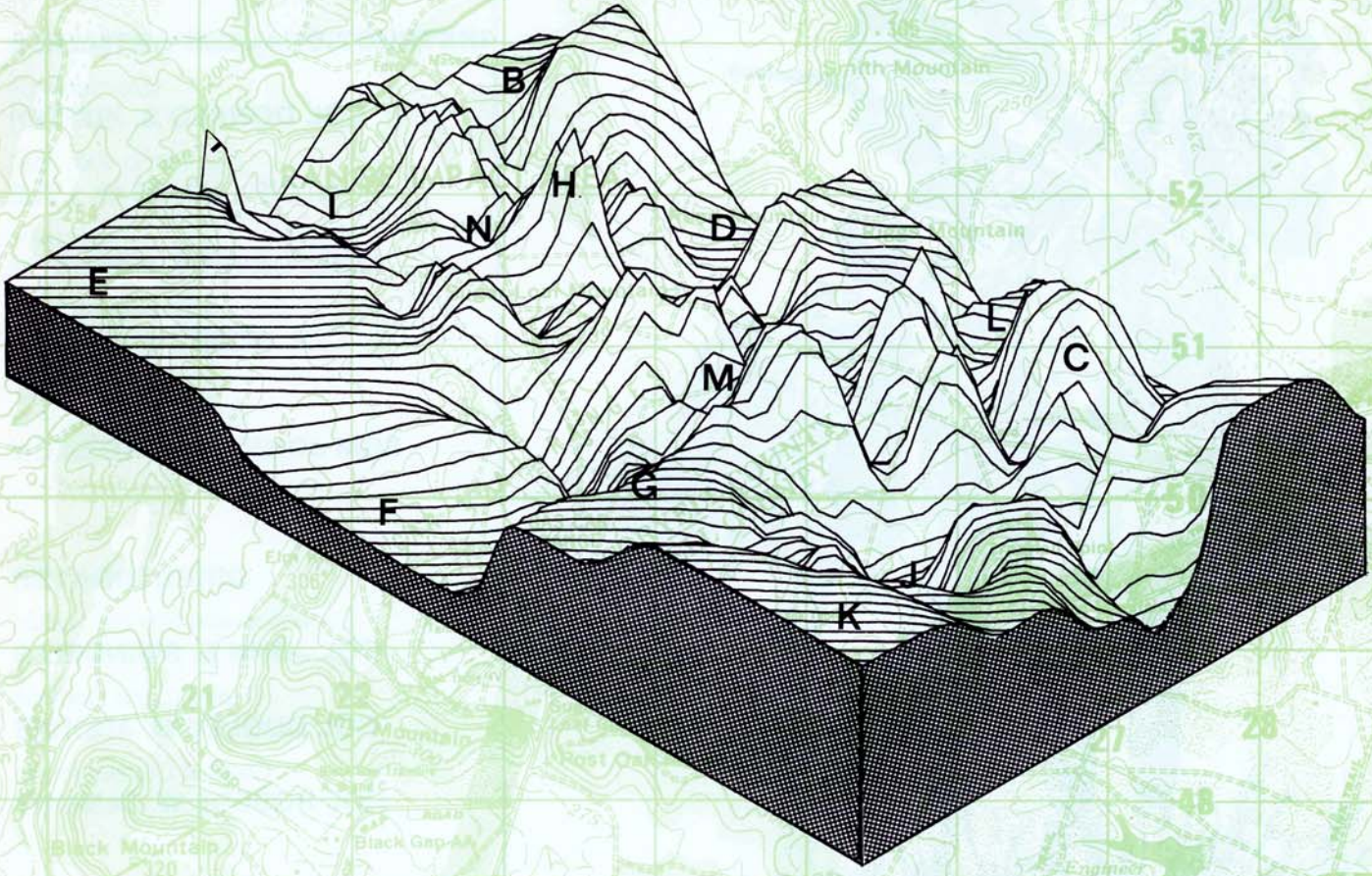
ARMOR

The Magazine of Mobile Warfare



March - April 1984

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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FEATURES

DEPARTMENTS

COVER

A computer, loaded with vegetation, terrain, and elevation data and linked to an X-Y plotter, created the three-dimensional view of Fort Hood on this month's cover. The process, described in an article on page 11, allows the user to select both the elevation and azimuth of the finished map.

LETTERS

Note to Contributors

It is *ARMOR* Magazine's policy to decline articles that have been submitted to or published by other U.S. Army publications.

Contributions to *ARMOR* should be made with the clear understanding that *ARMOR* will receive first, exclusive publication rights.

While we have reprinted articles from other publications—usually because the material was not readily available to our readers—we discourage multiple submissions because of the cost of publication and the limited space available.

Our policy is to accept or reject an article within a week of receipt. If we believe that another Army publication would be better suited to a particular manuscript, we will so advise the contributor.

Editor
ARMOR Magazine

One-Net System Questioned

Dear Sir,

Is any real improvement achieved using the one-net system outlined by Major Marlin and Captain Sweeney in "Improved Company Command and Control" in the November-December 1983 issue of *ARMOR* Magazine?

Although warning orders, reporting, and NBC alarms may be quickened by eavesdropping on your higher's net, the time to switch from one frequency to another using the remote capability of the AN/VRC-12 series radio is minimal. To monitor battalion or squadron is the mission of the TOC vehicle.

Command and control is achieved through the use of battle formations and drills in maneuver and FM communications in directing platoon fires. A tank company commander must direct/orchestrate platoon fires. Platoon leaders control engagements using platoon fire commands.

In the heat of battle, will a one-net system hold up under the friction inherent to combating a force that outnumbers you? FM 17-12 covers platoon fire planning and fire commands so as to destroy the enemy. Undisciplined fires detract from the principles of surprise and mass—the surprise associated with occupying a defensive battle position and overwhelming the enemy with disciplined and accurate platoon fires. The one-net system may quicken a company's responsiveness in an ARTEP or FTX scenario, but we will fail if small units cannot integrate maneuvers, command and control, NBC survival skills and gunnery.

I contend that the one-net system will fill the air with excessive chatter. The natural chatter which occurs on platoon nets during an engagement would destroy the disciplined communications about which Major Marlin and Captain Sweeney write. Platoon leaders and platoon sergeants have enough to handle without also trying to keep up with the battalion or squadron situation. Let's keep it simple, but let's not forget gunnery during our field problems.

JOHN N. LESKO, JR.
Captain, Armor
M Co, 3 Sq, 11 ACR

Experience Shows Single-Net Problems

Dear Sir,

Major Marlin and Captain Sweeney have provided some food for thought in their article "Improved Company Command and Control" in the November-December 1983 issue of *ARMOR* Magazine.

However, I think that readers should understand the limitations that govern a single net system in tactical operations. I cite my observations of a Bangladesh armored regiment (battalion) conducting squadron (troop) and troop (platoon) level collective training. There, the single net system is habitual. Here is what I have learned, and these points should be taken as *caveats* in preparing a unit for single net operations.

Marlin and Sweeney indicate that radio discipline is the key to a successful single net system. I believe they understate the case. The key is a directed net with minimal traffic. Leaders talk; others listen. What TCs can't garner from listening they must get from hand and arm signals. This type of net works very well if one platoon makes contact. If all hell breaks loose, my experience has been that the command net resembles the intercom of a B-17 under simultaneous fighter attack. In the case of a single net in that kind of situation, the FIST chief who can sort that out and bring fire, much less talk to the unit commander, has certainly won his spurs.

Units using a single net system must develop a sound battle drill which works on enemy stimulus and little else. A contact report clears the net, but the lead element must ideally be taking appropriate tactical action without any net chatter at all. Because of this need to act, and fast, the unit commander may find that the situation has been developed into decisive engagement of his lead elements because of their move into battle drill. Here the commander must train his people thoroughly. The Bangladeshii use foot drills—the crews walking through a series of situations and making all reports using good old "command voice."

In terms of maintaining the "rear link," i.e., keeping battalion in the picture, Marlin and Sweeney have thrown a new bit in. In the Commonwealth system, the XO maintains *the* link with battalion. Having digested the action, *he* passes back the information to battalion, *not* the CO. Since this is anathematic to the American system, the solution is not AN/VRC-12s but 2 AN/VRC-46s in each company headquarters tank. In this way, someone can react immediately to battalion. This arrangement saves both the CO and the XO dialing around trying to determine who's on which net doing what.

Now a final word on radios: Before declaring all these sets "extra" which do not form part of the single net system, the cautious man would look to the single net users in other armies. At each level of command, there are "pool" sets which can be used to expand nets if required or substitute for a NOR set. A critical few need to be maintained at the company level to bridge the gap.

The single net system is a good one. Most of us at one time or another have found ourselves pushed into a single net system due to jamming, "hot mikes," or whatever. The system has its strengths which have been ably addressed by Marlin and Sweeney. It also has some limitations, on which I have touched. The majority of these can be worked around, given thorough training and tight net discipline. The important thing is to know where the quicksand is and prepare your bridge accordingly.

THOMAS E. C. MARGRAVE
Major, Armor
Dhaka, Bangladesh

A Look at Morality

Dear Sir:

A dominating thought in our country today is the belief that the destructive nature of our modern weapons negates any concept of right or wrong between armed forces.

This is illogical and unjust, for it fails to examine the fundamental concepts upon which the (U.S.) armed force was established.

In the short period that I have been in the Army, I have met many soldiers, officers and enlisted, who do not understand the concept which makes our military a moral one. Therefore, in this letter I will explain the morality of the armed forces of the U.S., as I see it.

Throughout the past 3,436 years of recorded history, man has seen 268 years without war. Thus, governments and their respective armed forces have dominated our recorded history. Armed forces have been used in war by dictatorships, monarchies, oligarchies, democracies and republics. The bloody path that has been left in the wake of two or more armed forces engaging each

other has given rise to the generalization that armed forces are a necessary evil. Necessary because no government would want to be without the ability to wield physical might when it so desires. There is, though, one armed assemblage in all the history of mankind that cannot and should never accept the title of being a necessary evil. It is a landmark in military history, though is rarely ever recognized as such. It is the only moral armed assemblage ever created. That which I speak of is the military of the United States of America, whose morality is a direct derivative of a political philosophy.

To understand why the U.S. military is moral, one must first examine its purpose. In our republic, the power which is placed in the hands of and regulated by the minds of our military leaders is that of *retaliatory force,* it is not the power of initiatory force. Our military is the defender of the Constitution. Thus, the military is *not* the defender of a single man or a political party but, instead, defends a political philosophy which is given a concrete form within the objective system of laws established by the Constitution. Our military is performing the only proper function of government, the protection and preservation of its citizens' inalienable rights: life, liberty and the pursuit of happiness, from all enemies, foreign and domestic.

This being the U.S. military's purpose, what then is the purpose of our enemy's militaries? It might be said that they, too, are the defenders of their citizens' rights, but do they protect or enslave? When a government holds itself to be supreme and omnipotent and considers its citizens to be resources of the state, which are to be used as the government sees fit, then the government is a "statist" government and has no concept of inalienable rights. It survives as a parasite, living off its citizens. The values of a "statist" government are values which lead to one's death, for they attempt to gain the value of the mind by seizing the product of the mind. It is the "statist" government which is the root of all wars. Since they do not recognize inalienable rights of the individual, they do not recognize the rights of another nation and they will use their military aggressively as the initiator of war. If a military initiates a war, it will contradict its purpose of defense of its citizens and place itself under the whims of the "statist" government. Thus, the armed force is no longer the protector of its citizens but, instead, becomes their slave driver. A "statist" government's military is the tool they use to replace reason with might for they believe that the strength of their military will determine right from wrong. The "statist" government's survival rests on its military force and all of its values are achieved and maintained through force and fear. A government which forces its citizens to become soldiers has already engaged in that which its military is designed to protect the citizens from, armed coercion. Thus, the purpose of a "statist" government's military is that of slave driving and looting.

The morality which the armed assemblage of the U.S. possesses is a unique, historic, characteristic. It is not, though, a "given" of its nature. It was made a part of it through a rational, logical process of thought and objectively defined laws. For the U.S.'s military power to remain moral, the metaphysical fact of man's unique nature, inalienable rights, must be maintained and adhered to by the government.

JEFFREY A. WEBER
2d Lieutenant, Armor,
Fort Knox, KY

Cites 10th Cavalry Awards

Dear Sir,

I am writing in reference to your September-October 1983 issue that featured the 10th Cavalry on the back cover. The distinction and publicity afforded by this recognition was most appreciated by all of us here in the 2d Squadron (Air), 10th Cavalry, 7th Infantry Division.

There is, however, a correction to your cover that needs to be pointed out. Under "Decorations" it stated—none. In fact, the unit has been credited with participation in not fewer than 33 U.S. Army campaigns ranging from the Indian Wars through Vietnam and has been awarded 7 Presidential Unit Citations and a Valorous Unit Award. I hope that at some time you could print a small correction in order to accurately portray the proud heritage of the 10th Cavalry.

Your publication is appreciated by all of the cavalrymen here at the squadron. Throughout the years, we have appreciated this professional publication for its eminent value as a source of current information and thought to the entire armor community.

R. DENNIS KERR,
Lieutenant Colonel, Aviation
Commanding

As to the issue of decorations for the 10th Cavalry there are none (for the regiment.) You are correct, however, in stating that the 2d Squadron has been decorated eight times.

The manner in which a regiment is awarded credit or honors is rather complex. In sum, however, more than one third of regimental units must participate in an action for a regimental award. Furthermore, if more than one third participate, but the award is foreign (Korean Presidential Unit Citation, for example), only subunits receive the award and not the regiment.

As the issue and rules are complex, we publish only regimental awards and not company/troop or battalion/squadron awards. Ed.

ECM Uses in Counterattack Cited

Dear Sir,

Lieutenant Colonel Sherwood E. Ash's fine article "Counterattack Planning" that appeared in the November-December 1983 issue of *ARMOR* Magazine constitutes a refreshing return to concepts that will provide for an offensive spirit in our doctrinal tactics.

Colonel Ash does, however, ignore an element of combat power that will have an influence on timing and unity of effort on the part of the counterattacking force and, if used properly by U.S. commanders, can disrupt the enemy's first tactical echelon and hamper his overall response to the counterattack effort. That element is, of course, the electronic countermeasures (ECM) component of electronic warfare.

OPFOR ECM capabilities should drive commanders to train to such standards that counterattack forces can be employed under conditions of radio silence, or at least with minimal radio communications—of obvious import to timing and unity of effort. Similarly, friendly ECM can be used to render the lead elements of the attacking force vulnerable to counterattack, and to unhinge the timing of reaction by second tactical echelons.

Hence, use of the newly-fielded divisional MI battalion ECM assets (TACJAM, QUICKFIX, TRAFFICJAM) should be planned for in Ash's OPLAN 84-10A, and communications silence must be provided for in assembly of the forces, movement and execution of the CATX itself.

WAYNE E. LONG
HQ, 108th MI Bn
8th Inf Div (Mech)

More on Polish Cavalry

Dear Sir,

Mr. Zaloga may well be right in his interesting article on Polish cavalry in the January-February 1984 issue of *ARMOR,* that some people still believe the fable about charges on horseback against German tanks during the 1939 campaign in Poland. Mr. Zaloga is probably also right in suggesting that most of the accounts of what actually happened are not known to Western historians because they are in Polish. However, it is necessary to point out that the facts concerning the Polish cavalry in 1939 were dealt with in *ARMOR* almost 25 years ago, in an article by this writer in the September-October 1959 issue, and at greater length in a contemporary issue of the Royal Armoured Corps Journal.

As Mr. Zaloga's article is intended to make the facts more widely known, it is also worth pointing out that some details of it are not correct. First, there were only two and not three battalions of Polish *7TP* tanks: the third Polish tank battalion in 1939 was equipped with *R-35* tanks procured from France. Second, in some Polish cavalry regiments, one trooper in three still carried a lance in 1939, although the common sense of the troopers quickly prevailed once war began and an increasing number of lances were "lost." Third, *taczanka* was not a tankette, but a horse-drawn, four-wheeled machinegun carriage which was also used on a large scale by the Russian cavalry and it was from the latter, in fact, that the Polish cavalry copied it.

RICHARD M. OGORKIEWICZ
London, England

Polish Calvary Comments

Dear Sir,

I enjoyed seeing my article on Polish cavalry which appeared in the January-February 1984 issue of *Armor* Magazine. However, a couple of minor errors crept in which warrant comment.

On page 30 there is a reference to *taczanakas* which were defined to be tankettes. These were not tankettes, but small, four-wheeled vehicles mounting a single machine-gun. In horse cavalry units they were horse-drawn (there is a photo of one on pp 26-27), and in mechanized cavalry units they were mounted in small vehicles like jeeps. *Taczankas* were first used by the Ukranian anarchist bands under Makhno in the 1918-1920 Russian Civil War and subsequently adopted by both Soviet and Polish cavalry. They were used in the Soviet Army through 1945.

Secondly, I am baffled as to why Hollak's rank was changed from the Polish *Rotmistrz* to the German *Rittmeister*. Hollak was an officer in the Polish Army, not in the *Wehrmacht*. The English translation should have been captain or captain of the horse. . . .

STEVEN ZALOGA
Greenwich, CT

(Both points author Zaloga raises were editing errors. Ed.)

Old-Style Training Cost Lives

Dear Sir,

A response is necessary to Colonel Wolf and Captain Wilson's writings *(See January-February 1984 ARMOR letters and Captain Wilson's Pro Thought. Ed.)* Both works sent a chill down my spine as I read them.

The "simple, practical, and effective training methods" caused many casualties in WWII, Korea, and Vietnam. Units suffered heavy losses in their first battles because of mistakes caused by ineffective training. I recall reading a letter in *Yank* Magazine from an infantry platoon sergeant about how poorly trained the replacements he received were. Look at the incompetence and ticket-punching that occurred in Vietnam. Our Army does not have 200 years of training experience. It was not until WWI that formation drill—what we now know as D and C—ceased to be our battle tactics. WWII is where our how-to-train techniques date from. We have 200 years, not of experience, but of doing the same thing over and over.

Korea and Vietnam proved most techniques of the trade were not passed on. The mistakes of WWII were often repeated. The situation occurred because tasks and skills were not defined and forced home. Key fragments of the old training system still haunt us:

- At West Point, menus, dates and times of events must be memorized. This critical info takes precedence over meaningless data such as Soviet TO&Es, formations, weapons capabilities, strategy and tactics.
- Single-arm training is still the norm in too many places.
- Few NCOs and officers can state the points of our strategy.

The emphasis of the old system seems clear to me.

Colonel Wolf is right that training (teaching) is an art, but it is no better understood than strategy is. Simplicity is also important. I have received instruction under both systems and the performance-oriented training produces greater proficiency. All too often, the lecture method ended at that—a lecture. The old system killed the Doolittle Board Report at the end of WWII because it required performance to be used for the evaluation of personnel. Under the old training system, the individual American soldier and numerical superiority, not our training, carried the day. We cannot depend on these alone anymore.

Captain Wilson failed to understand the 11 principles of leadership and its traits. Not all are usable all of the time. A large part of the understanding rests with the Army for not defining leadership better. The points are correct, but the method of organizing them leaves much to be desired. Leadership breaks down into two categories: military skill and human relations. The skills are the most important part in battle and the human relations are the most important outside of battle. Even though one is more important than the other at times, both are still considered. The three simple principles Captain Wilson listed show one in human relations and two in military skills. A decision-making process of some kind is always in use, otherwise no decisions would be made. Ego state has no place in battle, but it does in our day-to-day functions.

Both writers showed a lack of appreciation for the soft sciences. Ignoring reality does not alter the way soldiers act. It only hinders the chain of command's ability to function. Social scientists can tell us much about why people act the way they do, but this data must be adapted to our environment. Tests are now going on to do this. The *Wehrmacht* proved the value of using soft sciences in WWII. Within a month, they could rebuild a division that had lost 80 percent of its line troops. It would fight like a veteran unit when placed back in the line. German units in situations similar to what happened to the U.S. 106th Division remained intact.

CHRISTOPHER F. SCHNEIDER
Staff Sergeant, Armor
Cicero, IN

Patton in Perspective

Dear Sir,

I wish to submit a rebuttal to a book review published in your July-August edition.

The book reviewed was "Patton's Principles: A Handbook for Managers," by Porter B. Williamson. The review was written by Captain James M. Dunn, an Armor officer stationed at Fort Knox. I believe I can speak adequately to the issue of the book's value as an entertaining piece of literature, as well as a "handbook for managers."

I served with the 2d Armored Division (August 1971-August 1977), a period which included the tenure of MG Patton (son of the book's subject), and where I came indirectly head first into the real-world application of Patton's principles through MG Patton's value system and management style (obviously learned from his father). I am currently finishing a doctoral degree in business administration and presented a formal (academic) review of Patton's principles for a strategic management policy course.

In researching my review, I talked with Mr. Williamson at length about his value system and mind set in writing the book, and received an exceptionally in-depth perception of General Patton's beliefs pertaining to the principles by which he lived.

I doubt if Captain Dunn went much further than the pages between the covers of the book, or he would not have presented the idea that Patton didn't intend the principles for on-the-job application. That was *precisely* the message!

Captain Dunn tries to define a difference between a "manager" and a "leader/commander." I submit that Captain Dunn doesn't understand any of his terms, or he would realize that the label applied generally in civilian terms—manager—is really no different than the military term, commander. It is this very narrow-mindedness of the civilian-military communities which perpetuates some mythical difference in being able to transfer military skills, "leadership," to civilian employment—"management."

ELLIOT M. SER
CW3, USAR
Sunrise, Florida

They Want A Scout Badge!

Dear Sir,

This is a letter about something that we hold very dear. We are all 19Ds, cavalry scouts, and proud of it.

In a few weeks, the infantry will begin practicing for the Expert Infantry Badge (EIB). Why in the world isn't there an Expert Scout Badge (ESB)?

We're combat troops, too, and from the standards displayed in EIB testing, we're very proficient combat troops. We don't have a red and white rope (fourragere) to wear on our right arms with our dress greens. Here in the infantry we aren't even allowed to wear cavalry brass! Instead, we have to wear armor brass. But, just like in the infantry, we ain't tankers!

Come on, Army! Recognize us and our potential. We have to pull recon missions for you, which means we meet the enemy *before* the infantry or armor does. We sometimes have to engage the enemy and destroy him to protect a battalion's flanks (screening mission). We really do have a lot to work on and quite a bit depends on us and our abilities. So give us, at least, our cavalry brass to wear. And how about some sort of ESB?

Signed by 19 Scouts
3d Bn, 10th Infantry
Fort Polk, LA

COMMANDER'S HATCH

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

Combat Maintenance: Training in Peacetime

Our ability to conduct maintenance in combat is fundamental to fighting and winning on the day of war. Combat maintenance differs dramatically from peacetime maintenance; yet we do not presently train on how to maintain during combat.

To address this and other concerns, the Armor School developed a Maintenance White Paper which focused on achieving a unified, coordinated and cohesive organizational maintenance structure to support the Close Combat Heavy (CCH) Force. The Maintenance White Paper served as the basis for discussions by the "Maintaining Armor" panel, chaired by LTG Galvin, during the 1983 Armor Conference. Feedback from observers and participants, as well as the recommendations of the panel, provided a wealth of ideas from which we have developed a number of initiatives with which to attack the combat maintenance training issue.

One of the most controversial and emotional issues identified in the Maintenance White Paper involves the force structure and doctrine for consolidated maintenance in the Division 86 reorganization. Notwithstanding the considerable debate on this subject, we will not know with any degree of certainty whether battalion consolidated maintenance will work until it is properly implemented, operated and evaluated. In this regard, we're on track—virtually all senior commanders have indicated their support for a proper test of our organization and doctrine in their respective divisions. This will provide an opportunity for midcourse corrections in our thrust and direction, based on fact rather than opinion, and is the key to a soundly evolved organizational maintenance doctrine.

An essential element in converting to the Division 86 maintenance organization is the establishment of training requirements for the armor battalion's maintenance platoon and company maintenance teams. A serious training void exists between the individual maintenance skills addressed in SQT programs and the few collective maintenance tasks found in ARTEP 71-2. To fill this void we are developing Mission Training Plans (MTPs) for the Division 86 armor battalion's maintenance platoon and company maintenance teams. MTPs will provide commanders and maintenance supervisors with a tool to train their maintenance elements for combat.

MTPs are more than a product improvement of the ARTEP. They are part of a new generation of training materials that place greater emphasis on leader training and on aspects of how to conduct training. Taking the crawl-walk-run approach, maintenance MTP's are self-contained and designed to sustain individual skills through the execution of collective training. MTPs provide the tasks, conditions and standards, support requirements, and training and evaluation outlines for a number of key collective maintenance tasks. Commanders and maintenance supervisors may use these collective tasks as building blocks to train their maintenance elements to execute more complicated missions. This can be accomplished during planned Situational Training Exercises (STX). Each MTP includes a number of sample STXs that may be used to train maintenance elements under simulated combat conditions. We expect to field draft MTPs for the company maintenance team in the third quarter of FY 84 and for the battalion maintenance platoon during the first quarter of FY 85.

Another product under development is the Field Procedures Guide that will support peacetime maintenance requirements, field applications, and the orderly transition to war. Our approach is to combine maintenance checks with existing operational documents (platoon, company and battalion standard operating procedures) to form a single reference similar in form and format to the aviation style operators' checklist. PMCS checks will be divided up among all crewmembers. Each will have designated responsibilities for before-, during-, at the half-, and after-, operational checks. These checks will be combined with the existing operational checklists for each crewmember so that both maintenance and operational checks are done in a logical order from a single checklist. A simple set of codes is used to identify checks with special significant (i.e., not mission capable) criteria for reporting and night operations.

The Field Procedures Guide is small (approximately four

by eight inches), easy to stow in the tank and easy to use in adverse weather. Its proper use will require our tank crewmembers to have expert knowledge of their operator's manuals. A key phrase, like *"Adjusting Link Assembly,"* must be sufficient to remind the crewmember of what must be checked and how the check should be performed. The following example is from our draft Driver's Guide *(M1).* The checks shown are part of those done at the halt:

C. Operation Checks.

*1. (R) Adjusting link assembly
2. (R/L) Track tension
3. (R) Roadwheel and compensating idler hubs
*4. (R) Roadwheel and compensating idler wheels
5. (R) Shock absorbers
*6. (R) Torsion bar
*7. (R) Skirts, fenders and mud guards
*8. (R) Support rollers
*9. Hub and sprockets (2)
*10. (R) Shoes, center guides and end connectors
*11. Asst w/refuel and resupply when available

R: Indicates right side
R/L: Indicates right and left side
*: Indicates a reportable readiness check

Technical manuals must continue to be readily available for consultation. However, just as we expect tank commanders to *know* battle drill (without immediate reference to a field manual) our crewmembers must possess the knowledge to perform their maintenance responsibilities with skill and precision in all conditions. Simplification of PMCS is possible and needed—the cost is greater knowledge, attention to detail, repetitive training and command emphasis. Our initial effort is on the *M1* and as soon as we have completed informal testing with units at Fort Knox, we will offer this checklist to you for use and comment.

We are also working to bring peacetime and combat maintenance training into a single focus in resident instruction at the Armor School. Greater numbers of technically qualified, fully trained senior and systems mechanics and maintenance supervisors are needed to ensure quality maintenance and maintenance training. Establishment of selected Career Management Field (CMF) 63 skill level 2 and 3 resident training programs at Fort Knox continues to be an essential effort.

CG TRADOC has approved our request to establish primary technical (45E20, 63E20, 63Y20) and basic technical (63E30) training courses at Fort Knox during FY 84 and also to transfer the ongoing 63E30 basic technical course from the Ordnance Center to the Armor Center this year. Our substantial experience in organizational level maintenance training makes the Armor School the logical institution for follow-on primary and basic technical training, particularly given our vested interest in its success.

As a follow-on establishing *(M1)* PTC/BTC at Fort Knox we will, subject to approval by CG TRADOC, transfer additional PTC/BTC training from the Ordnance Center and School. Ultimately, our goal is to train all organizational maintenance system mechanics, skill level 1 through 3, who support the armor force. Incidentally, the Ordnance Center and School retains proponency for organizational maintenance; we're just going to help shoulder the training load.

As an important adjunct to our resident training plans, we are also developing an exportable Supervised On the Job Training (SOJT) program which will assist you in building the technical competency of maintenance personnel while assigned to your unit. This exportable package will be available for discussion at this year's Armor Conference.

Resident maintenance training for Armor officers has for many years consisted of classroom training with little or no application in a field environment. In order to maintain in combat we must train our armor leaders to perform key maintanance tasks under combat conditions. As a result, maintenance training for lieutenants and captains is being directed to meet this goal.

The AOB maintenance program of instruction (POI) implemented in February 1984 includes less classroom instruction and more hands-on training. Again, using the crawl-walk-run approach, the AOB student learns preventive maintenance checks and services (PMCS) and basic field recovery techniques in a motor pool environment. He applies his learned maintenance skills during all phases of the Mounted Tactical Training Exercise, the "10-day War," to include the pre-combat checks, maneuver and post operations phases. The AOB student also participates in a Logistical Control Exercise (LCX) where he and his fellow classmates are evaluated on their ability to rearm, refuel and maintain their vehicles and equipment in a field environment. I might add that one of our goals is to have a company maintenance team participate in the "10-Day War" for the Armor Basic Course to ensure that our resident training familiarizes these officers with the capabilities, limitations and basic employment of this training technique.

The Division 86 organization has greatly changed the responsibility of the company commander. As a result, AOAC maintenance training will focus on hands-on PMCS training and on how maintenance assets are maneuvered on the battlefield. Again, we plan to bridge the gap between the classroom and the field by requiring the AOAC student to apply his knowledge during a 3-day mounted tactical training exercise. In addition to these maneuver exercises, the student will participate in a map exercise (MAPEX) in which he will role-play key maintenance operations on the battlefield. We plan to use this MAPEX as a lead-in to a maintenance STX executed in the field. The MAPEX will be implemented in March 1984 with a fully updated AOAC maintenance training package to follow during the summer of 1984.

The CCH Force of today is a force in transition. Equipment is being modernized, doctrine is being revised, organizational structures are changing and revised maintenance concepts are being evaluated. These initiatives will keep the CCH force in a transitional status through 1990. Despite all these changes, we must be ready for war at *all* times. To fight outnumbered and win, our fighting systems must be available—maneuver requires mobility. The keys are training and combat emphasis. As Chief of Armor, I want to reconfirm with you, the Armor Force, my personal feelings about the essentiality of proper maintenance. Together we will find the solutions to the difficult problems confronting us as we develop a maintenance force structure and doctrine capable of sustaining the force in offensive combat. Forge the Thunderbolt!

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

Basic NCO Course (Armor)

Since the emergence of the Basic Noncommissioned Officer Course (Armor) as the Noncommissioned Officers Education System, varied opinions have been expressed about its content. Many of the senior noncommissioned officers wanted a return to the old Tank Commanders Course, as taught at the Combined Arms School, Vilseck, Germany. Others expressed a need for more skill level 1 and 2 subjects to ensure each student could properly supervise subordinates. Still others could not understand why we have a basic NCO course at all, since it is the unit's responsibility to train.

As a graduate of the Tank Commanders Course at Vilseck, I also supported that type of course. Since I had the opportunity to serve as the NCOIC of the Tactics Phase Gunnery/Tactics Division in Vilseck, I also supported training cavalry noncommissioned officers in the same manner as we did at the Armored Cavalry Platoon Leaders course, but at the scout squad/section level. Both courses were hands-on oriented training which was both challenging and stressful. In both courses, every student was required to perform to standard, as directed by the appropriate manual. The students were able to take their instruction back to their units and train their soldiers to the same standards without worrying about standard changes because of local commander or NCO philosophies.

The objective of the new Basic Noncommissioned Officer Course (Armor) extends beyond the course itself. It is a six-week course aimed at graduating a competent noncommissioned officer, one who knows how to fight and how to train his soldiers to fight.

Many have asked, "Why a six-week course? Why can't we teach the basic course in four weeks?" The four-week course never contained the subject material that was necessary to train a tank commander or cavalry squad leader effectively for today's battlefield. The new six-week basic course will graduate a noncommissioned officer competent both to lead and to teach his soldiers to maintain and fight their equipment.

Maintenance, for example, is taught initially in the classroom. However, maintenance skills are preserved by providing time to ensure PMCS is done correctly each and every time the vehicle is used. All maintenance checks are performed using appropriate manuals and supervised by a competent instructor.

Prior to range firing, prepare-to-fire checks are performed as a scheduled class. At the conclusion of each scheduled class, if maintenance has not been performed correctly (as required by the -10 manual), then the student is required to *do it again.* If you don't do it to standards, you do it again. If you can't do it to standards, you can't be in charge.

Naturally, the course design is one that is stressful and challenging, but it allows for mistakes and allows the students to learn from each other. The attitude is "crawl, walk, run" as the students perform as crews or squads. They train together, eat together and are billetted in the same area. Examples of the progressive nature of the training are the requirements in situational training exercises (STX), A, B, and C, using MILES and OPFOR.

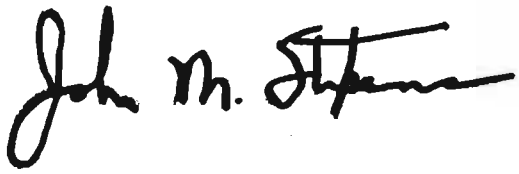
A crew or squad is required to navigate from one point to another over selected terrain. After receiving a mis-

sion order, they are required to tactically maneuver the vehicle while encountering different situations that require immediate actions to destroy or neutralize the threat and continue the mission. They may encounter single or multiple engagements, obstacles, and NBC or artillery attacks. At the conclusion of each exercise the crew or squad is given an after-action review. Each exercise is more intense, STX A (crawl), STX B (walk), STX C (run), and if they don't do it right, they go back and *do it again.*

Every task required in the STX is a skill level 3 task. The tasks are taught in the classroom prior to testing in the field. Each crew or squad uses sand table exercises the day prior to their field work and discusses their operations with the instructors. You can sense the feeling of accomplishment from both students and instructors when they have completed STX C, the run phase, knowing they have tactically maneuvered against an OPFOR capable of fire and maneuver, destroyed or neutralized the opponent, and successfully completed the mission.

Attention to detail in basics is emphasized concurrently with the course, both at the individual, crew, and squad level. Personal, billet, and vehicle inspections are done concurrently each day, either in formation with BDUs or Class As, and in the motor pool with the field uniform. The students *march* to the motor pool to prepare for field operations. They must load the vehicle in accordance with the loading plan and prepare the vehicle for the field. After completion, they are given a precombat inspection. If it is not right, students are required to unload the vehicle and *do it again.* Let me note here that it does not take very many *do it agains* before they get the message. They understand that checklists, loading plans, SOPs, etc., are to be precisely followed. The platoon leader or platoon sergeant should not be required to supervise them excessively.

The new BNCOC goes beyond any skill level 3 course that I have known. However, the new demands are a necessity. High standards must begin with the individual if we expect the crew, platoon, and company to perform to standard. The attention to detail to checklists, loading plans, and SOPs is part of survival. Every crew or squad must do it the same way. Maintenance must be performed and checked as required. Gunnery proficiency and tactical proficiency must be trained and employed together. The tank commander or scout squad leader must be able to accomplish those tasks without direct supervision The tank commander must realize that when he is engaged in a fight, so are his platoon leader and platoon sergeant. The scout squad leader must realize that his commander depends on his squad as part of the eyes and ears of the unit. If the right soldier is selected for school, the BNCOC (armor) will greatly assist in his development.



1984 Armor Conference

Armor: Taking Stock and Directions for Excellence

Tentative Agenda

Tuesday, 8 May 1984

0800-2200	Registration - Officers Club
1600-1730	Update of the Regimental System
1800-1930	Garden Party - Qtrs 1
1930-2230	Buffet Dinner - Officers Club

Wednesday, 9 May 1984

0700-0800	Late Registration - Armor School Library, Gaffey Hall (Bldg 2369)
0800-1100	Opening Remarks, Keynote Address and Presentations
1100-1145	Armor Association General Membership Meeting
1145-1300	Armor Association Executive Council Luncheon
1300-1500	Presentations
1600-1800	Demonstrations/Displays
1900-2200	Armor Association Banquet

Thursday, 10 May 1984

0800-1100	Presentations
1100-1300	Chief of Armor Luncheon (invitational)
1300-1430	Panel Reports
1430-1500	Closing Remarks

MASTER GUNNER'S CORNER

Captain Mark J. Reardon
2d Infantry Division
Camp Casey, Korea

Should We Rethink Standard Lead?

Many of the tanks in today's active Army and National Guard armored battalions lack such sophisticated systems as the *M21* computer with automatically compensates for the lead required to hit targets moving up to 44 mph. These older vehicles—the *M48A5, M60* and *M60A1*—mount an *M17* stereoscopic rangefinder and an *M13* mechanical computer.

Using this type of fire control, the gunner has to manually induce lead on a moving target by shifting the reticle and using *standard lead.* The lead is determined by the type of ammunition used and is generally understood to be 2.5 mils for APDS, 5 mils for HEAT and 7.5 mils for HEP.

The problem we face is that many of the gunnery methods now being taught to *M48A5* and *M60A1* crews were developed years ago and are based on the battlefield speeds and characteristics of vehicles existing at that time. The *standard lead* formula was computed for vehicles moving between 10-15 mph.

Now we have entered a new age of radical armored vehicle design changes and technological innovations. Hydrostatic suspensions, turbine engines, and other features will allow for ever-increasing armor mobility on all types of terrain. The battlefield will be characterized by masses of faster-moving mechanized units, resulting in a more fluid tactical situation. This will increase the number of moving engagements and the target speeds at which they will take place. Armored units making the *deep thrust* must maintain their momentum, be aggressive, fire on the move and bypass strong opposition if they are to be successful. Consequently, tactics and technology are beginning to render the older gunnery techniques, such as the *standard lead,* obsolete.

When we possess a tank capable of accurately engaging moving targets while itself moving at 20-30 mph, can we not expect our enemies to soon field similar vehicles? The armor community must modify its gunnery philosophy when faced with the difficulties which *M60A1* and *M60A3* or *M1* degraded systems may encounter on the future battlefield.

In order to arrive at a solution in which there is a high probability of hits, certain factors should be examined, including ammunition characteristics, range, target profile/size, and speed, all of which are analyzed in their relation to the current aim-off, or lead, techniques now being taught. It remains to be seen if the *standard lead* is still applicable. If not, what can we teach our gunners in order to overcome the problem?

We are teaching our gunners to engage some of the more maneuverable vehicles in the Threat inventory with HEAT-T, which has a mediocre 336 m/sec velocity. This velocity characteristic is important, for the longer the time of flight, the greater distance the target can travel in any direction, thus multiplying the difficulties of getting a first round hit.

The 19-series soldiers manuals are concerned with standard target lead and translate those leads into feet at various ranges using the WORM formula (width over range (in thousands) times mils). So when we aim, using the HEAT-T *standard lead* on a moving *T-62* at 1,500 meters, the gun tube is actually pointing 24.375 feet in front of the target.

But some of today's targets are going to be moving faster than yesterday's leads allow for.

When using any type of ammunition except SABOT, at ranges exceeding battlesight, there is a tendency for the target to move further than the area covered by the lead.

Threat tactics favor high speed approaches which enable the attacker to close quickly. These tactics will come into greater favor once they apply turbine technology on a large scale to their armored forces.

All types of ammunition are effective (no lead required) up to 1,000 meters. Beyond 1,500-2,000 meters, the use of HEAT and HEP against moving targets is not conducive to achieving a high probability of first round hits. SABOT is affected at ranges beyond 2,000 meters.

Our crewmen are taught that their vehicles have superior fire control and that they should engage at extended ranges. Is this true, or will we concede those areas beyond battlesight ranges on the mobile battlefield?

We cannot realistically expect to fight all of our future battles in the restricted areas of southern-central Germany and, therefore, our crews should be confident when they engage moving targets at extended ranges.

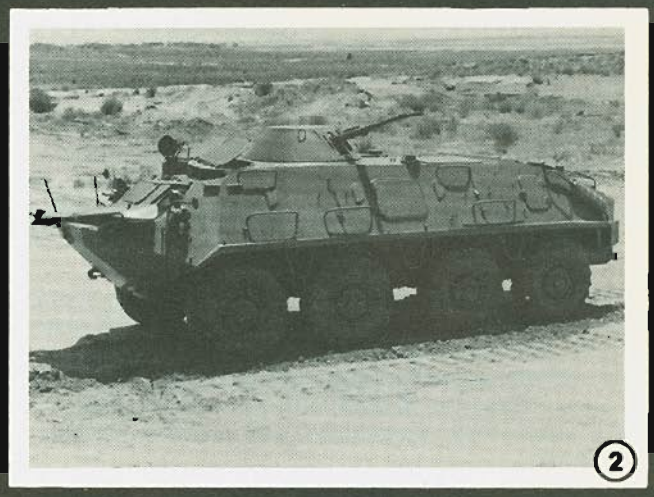
The dilemma exists, and a solution must be found. An in-depth study of current armor technology, coupled with the probabilities of effectively engaging today's and tomorrow's target array, may well lead to revised aim-off techniques.

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 49)

1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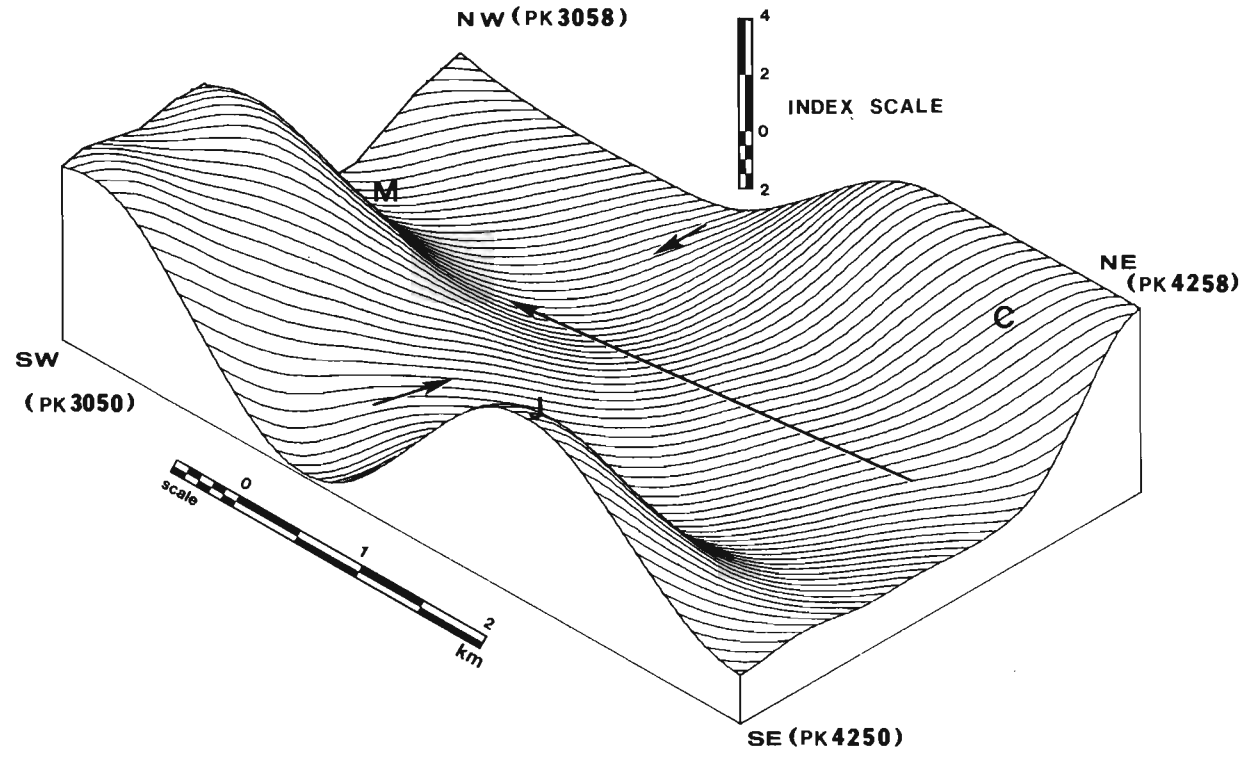
3


4


5


6



Map 6. Detail of NE quadrant

Adding a Third Dimension to Terrain Analysis

by Captain Charles R. Graham and Dr. J. Richard Jones

Modern computer technology now makes it possible to prepare a new kind of terrain map that shows the lay of the land far more graphically than standard topographic maps.

The application of this technology offers an effective method of improving a field commander's assessment of terrain and trafficability, the most important factors in the successful employment of armored fighting vehicles.

This article describes how the technology works and how it was applied to map a section of terrain many American tankers know well, the maneuver area within the Fort Hood, Texas, military reservation. The article includes maps plotted using this new technology and will show how the techniques can be applied elsewhere.

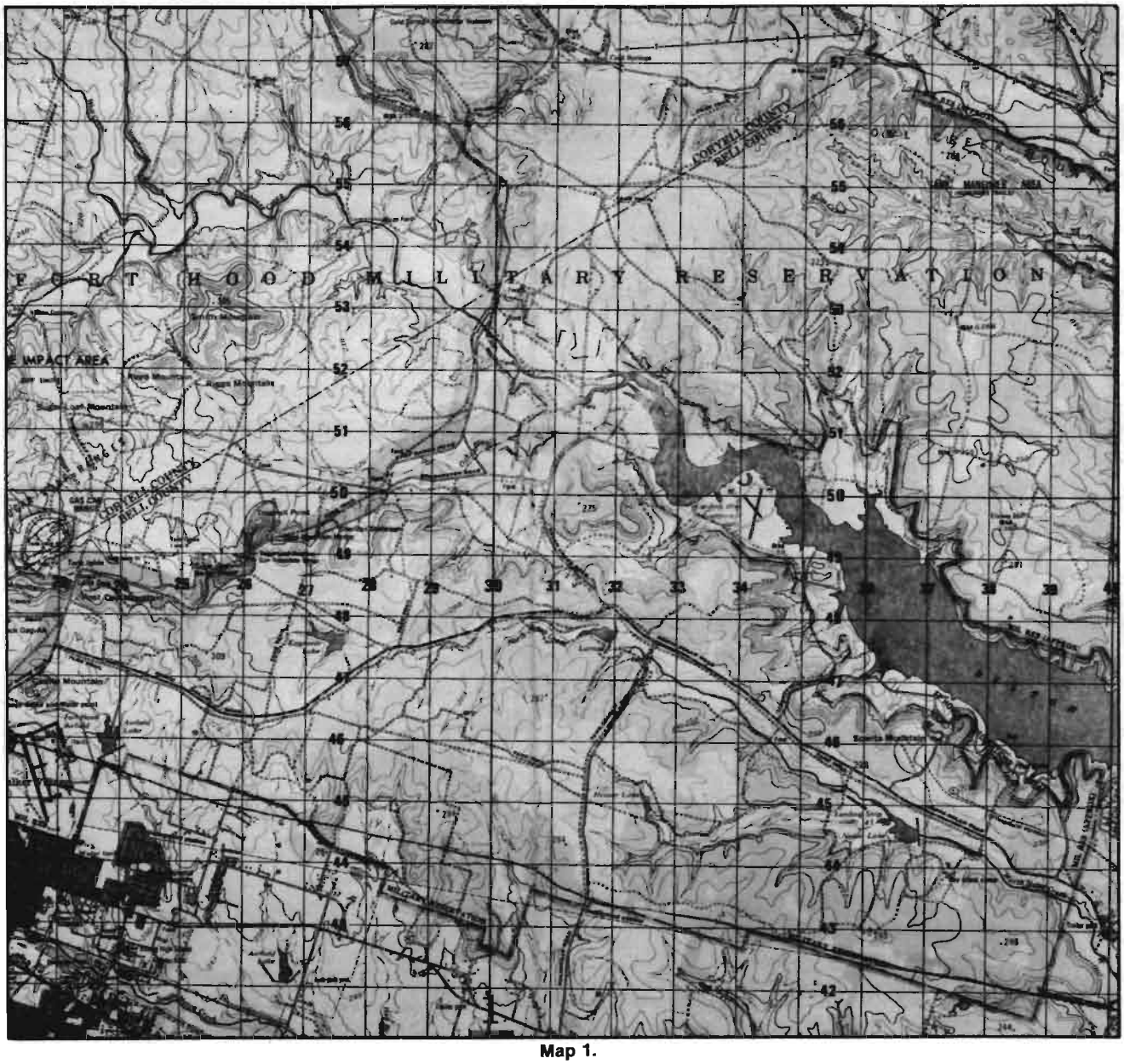
While the experiment described here was conducted on a large mainframe computer, theoretically the approach is applicable to smaller microcomputers, too, once appropriate software is developed. This process offers the prospect of instantly generated, highly realistic terrain maps which appear to be three-dimensional. With a microcomputer and inexpensive X-Y plotter mounted in a command post track, it might even be feasible to create maps while the unit is on the move, using terrain data stored in the computer memory.

Moreover, the method can generate maps on any scale and the computer program allows these maps to be prepared from any elevation of view or azimuthal orientation, allowing the commander—quite literally—almost any perspective he wants on the battlefield he seeks to dominate.

The Problem

Armor commanders must appreciate the lay of the land, not only to understand where their forces and the enemy's can move, but to plan obstacles, to assure interlocking fields of fire, to take advantage of terrain masking, to plan artillery support, and to estimate where an economy-of-force will suffice.

Usually, this understanding comes from map study, but because standard topographic maps represent three



Map 1.

dimensions as two, considerable interpretation and imagination are required.

Ideally, it would be better for the commander to get out on the ground himself for a personal appreciation, but this is often impossible or impractical, especially in high-speed operations.

Some on-the-spot terrain information will come in from forward scouts and from word-of-mouth, the collected experience of the soldiers who have fought the same terrain previously. This happens routinely at Fort Hood, for example. U.S. tankers in training there have long understood that there are times of the year when Cowhouse Creek is unfordable; they know there are few good armor routes up Manning Mountain, and they know the places a tank is likely to throw a track or become mired. This terrain knowledge is passed on in the verbal tradition of tankers who have trained here for many years.

These same maneuver areas have been mapped and studied by the U.S. Army Corps of Engineers, but this information, too, is seldom put to use systematically. Elevation and soils data, along with information on vegetation, is also readily available, though seldom used.

The computer allows all of these kinds of information to be stored, quantified, manipulated and presented when necessary. Often, the commander will find that when all factors are taken into account in his evaluation of terrain, trafficability may turn out to be better—and sometimes worse—than a pure map study might suggest.

In the experiment described here, an area thought to be impassable to armored vehicles, on the basis of a map evaluation, turned out to have avenues of trafficability, along with some areas that really *were* as impassable as they seemed.

The Study Area

The authors selected a section of the Fort Hood reservation that did not have a prepared trafficability map, but with well-studied soils, vegetation, and elevation data. The area is shown in Map 1, a reduction (for space reasons) of the standard 1:50,000 topographic map. (Defense Mapping Agency Topographic Center, 1976, Sheet 6446, "Killeen").

Fort Hood terrain seen in conventional 1:50,000 topographic map, opposite page, is shown at right in four computer-generated views, each from a different azimuth. Computer program also allows user to select angle of viewing elevation. A more detailed view of the NE quadrant is seen on page 11. The letters correspond to the points on these maps.

Much of this area of Fort Hood, until recently, was little used by armor units for training; the areas occupied a sort of "forbidden zone" in the tankers' minds because it was so unfamiliar. It therefore offered excellent prospects for a test area; the necessary terrain data was accessible as separate maps but had not been correlated.

Moving a little ahead of ourselves, the results of the study are shown in Maps 2-5, which show four different views of the study area, each from a separate azimuth, offering a full 360-degree evaluation. Map 6 (See Page 11) further demonstrates the versatility of the process. This map represents an isolation of the quadrant of the best area (corresponding roughly to boundary coordinates PK 3058 to 4258 and 3050 to 4250. The section presented is enlarged four times over the scale of the four basic maps (Maps 2-5). The aspect of Map 6 is oriented on an azimuth of 315 degrees.

This particular sector, judged strictly on topographic map considerations, is one of the most formidable and varied terrain sectors within the overall study area, but when all values are considered, a broad area of excellent trafficability can be seen encompassing much of the Owl Creek Mountain plateau, with wide avenues of approach from the northwest, east, and south. The most northeasterly portion *could* virtually be excluded from tactical planning.

Although the following technical description of the Fort Hood terrain mapping project may include more detail than many ARMOR readers will require, the information is presented here to enable those familiar with data processing equipment to more clearly visualize the experiment so that they can attempt to duplicate the authors' results, if they wish. Ed.

The equipment needs for the project was minimal: a standard 1:50,000 military topographic map and maps of soil and vegetation types. The computer used was the Control Data Corporation Dual Cyber 170/750 system with two programs on line, the Statistical Package for the Social Sciences (SPSS) and the interactive SYMAP/-SYMVU graphic software program.

Although the SPSS was originally developed to analyze social sciences data, many of the statistical functions within the package are valid for processing terrain data. For example, the package includes bivariate and multivariate routines useful in terrain analysis. Additionally, there are options for transforming data and writing subprograms. (Table 1 lists the simple computer statements that form the basis for this study.)

SPSS can compute a series of data analyses with such simple statements. The example in Table 1 demonstrates this simplicity, utilizing the COMPUTE and IF commands. The application of these commands will be explained shortly.

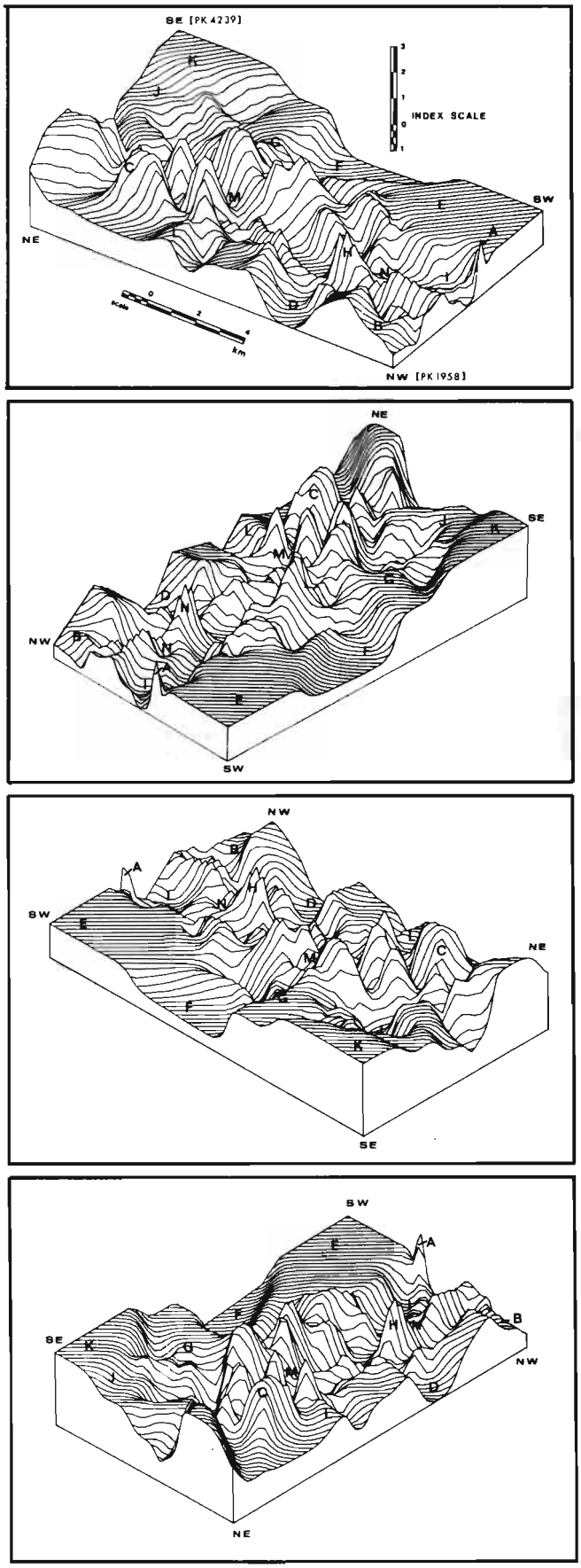
Of the numerous graphics software packages available, the SYMAP/SYMVU package is suggested for the presentation of three-dimensional terrain data. This interactive program has been used successfully to interpret data from a variety of terrain environments.

SYMAP consists of six subpackages:

A-Outline—Defines the outer boundary of the study area.

B-Data Points—Locates the geographical coordi-

Four Views of the Study Area



Maps 2-5.

nates of the data.

C-Otolegends—Allows for legends, scales, etc.

D-Barriers—Creates data interpolation barriers of variable strength.

E-Values—These represent the data values.

F-Map—A series of electives relating to map size, available statistical techniques, contour intervals, interpolation radius of contours, etc.

The major options of the SYMVU package are the azimuth orientation and the viewing angle from which the plat is observed. (Maps 2-6, for example, are viewed from the perspective of 35 degrees elevation). The SYMVU package can operate independently or interactively with a data matrix created with SYMAP. The output is produced as a three-dimensional plot. the interactive mode was used during this experiment.

Table 1. Computer Statements Used in Study

Card Column 1	Card Column 16
Run Name	Fort Hood Terrain Analysis
Variable List	Rise, Run, Soil, Veget
Input Medium	Card
Input Format	Fixed (3X, 2(F5.2, 1X), 2(F1.0))
N of Cases	292
Compute	Slope=(Rise/Run×100
Recode	Slope (0.0 Thru 8.0=1) (8.1 Thru 15.0=2) (15.1 Thru 30.0=3) (30.1 Thru 40.0=4) (40.1 Thru 50.0=5) (50.1 Thru 60.0=6)
Compute	Index=(Slope + Soil + Veget)
IF	((Slope GT2) and (Soil GT 2)) Index =Index+15
IF	((Slope GT2) and (Veget GT2)) Index =Index+15
Recode	Index (1 Thru 4=1) (5 Thru 6=2) (7 Thru 8=3) (9 Thru 12=4) (13=5) (14 Thru Highest=6)
Print Format	Index (2)
Write Cases	(19X,F1.0) Index
Read Input Data	
List Cases	Cases=292/Variables=Index
Finish	

How the Experiment Was Set Up

Setting up the computer to prepare the three-dimensional views show in Maps 2-6 entailed the following steps:

•In order to adapt the standard 1:50,000 military topographic map and grid system to a format consistent with SYMAP/SYMVU, it was necessary to first overlay the map with scaled graph paper (five squares to an inch). The graph N-S and E-W grid lines were coordinated accordingly. This provided a map format from which the terrain model was developed. A standard X-Y digitized plotter could also have been used for greater efficiency.

•Data points were selected and marked on the graph overlay. To ensure an adequate number of samples and randomness, we decided to use the existing military grid intersections, transposed to the overlay, as the data points. Points lying outside the reservation boundaries, in park areas, or lying wholly within a body of water were discarded. A total of 292 data points were selected.

•The map coordinate points were recoded into graph coordinates and key-punched onto standard computer cards.

•Using the Corps of Engineers soil and vegetation maps, six categories were established for each of these two variables (see Table 2). The value occurring at each coordinate grid intersection was rank ordered for individual effects on trafficability, category 1 being the best and category 6 being the worst.

•Slope percentages were calculated for each point using the formula rise/run X 100 = %. To maintain simplicity, the results of these percentages were also recoded into the six categories (outlined in Table 2.) Ultimately,

Table 2. Slope, Soil and Vegetation Categories

(Categories are for designating allowances for mobility *only*. Ranking is from least inhibitive to most inhibitive.)

Assumptions:
Test vehicle is M60 family MBT, combat loaded.
Weight: 56.6 tons
Gnd Pressure: 11.5 psi
Eng HP: 750
Grade Ascent/Descent: 60%
Grade Side-Slope: 30%

Slope Categories

0 - 8.0% -	1
8.1-15.0% -	2
15.1-30.0% -	3
30.1-40.0% -	4
40.1-50.0% -	5
50.1-60.0% -	6

Vegetation Description	Category
Grasses; 1 m or less in height; Trees/scrub does not exceeed 10%	1
Mixed coniferous/deciduous scrub; 3-3.75 cm dia; spaced 2 m or less; height less than 3 m	2
Coniferous scrub; 6.25 cm dia; spaced 1-4 m; height 3 m	3
Mixed coniferous/deciduous trees; 5.5-6.25 cm dia; spaced 1-3 m; height 4.5-5m	4
Deciduous trees; 11.25-15 cm dia; spaced 2-3.5 m; height 4.5-6.5 m	5
Deciduous scrub; 12.5 cm dia; 0 m space; height 4 m	6

Soils Description	Category
Speck/Purves Assoc. Dark gray to red brown clay w/clayey sand lenses Some rutting.	1
Tarrent & Brackett Assoc. Dark to light brown clayey cobble. Some erosional rutting.	2
Unnamed Gray-Brown to brown clayey gravel and sand. Some large stones. Shallow.	3
Unnamed Dark gray to black clay w/silty sand wet; subject to flooding.	4
Denton-San Saba-Krum Assoc. Gray-brown to brown silty clay. High shrink-swell.	5
Trinity-Houston Black-Frio Assoc. Dark gray to black clays and silty clay. Wet; subject to flooding.	6

however, only the first three slope categories were used because percentages were not identified that exceeded the upper limit of category 3.

•The variable categories were then key-punched onto computer cards and indexed by the computer. There were also two IF statements provided which took into effect the compounding effect of poor soils and impassable vegetation on slope accessibility (see Table 1). The resulting index number, a single value for each grid intersection, was then also automatically re-punched into an index data set.

•The two sets of 292 computer cards, one for the data point coordinates (B-data points), the other for the index values of trafficability (E-values), were combined into a single data set for the computation of the three-dimensional map with the SYMAP/SYMVU package.

The final products, illustrated in Maps 2 through 5, represent four different azimuthal views providing a full 360-degree evaluation of the test area. Being familiar with military maps of topographic relief, the tanker can quickly and easily grasp the relationship between trafficability and mobility.

Map 6, the isolation of the NE quadrant, allows the maneuver battalions and companies a large scale map analysis of an area for which they could conceivably be held responsible. Maps 2-5 provide information for the general planning of a small scale map operation (brigade and higher).

Conclusion

The three-dimensional presentation of trafficability provided by these maps gives useful information to assist the commander. He can determine whether or not a particular avenue of approach into or out of his sector is indeed the high speed and practical route it may appear to be on his two-dimensional topographic map. He can determine which parts of his sector require his primary focus of attention, or conversely, which areas can be simply reinforced with additional obstacles and defended by a smaller force than he might otherwise assign. After all, if the Threat's mechanized forces can't move through a given area, why expend a great deal of effort in defending it?

The S3 Operations officer can quickly assess the different route combinations to insure his commander's force arrives, and arrives in force. He can analyze the battlefield for usable avenues which may appear on his map to be uneconomical. The maps also allow everyone the opportunity to see, three-dimensionally, the advantages and disadvantages, the opportunities and the risks, offered by any given area *before* the first tank gets mired or stopped. Indeed, it offers this opportunity before anyone has had the opportunity to physically reconnoiter the battlefield.

The advent of the personal-type computer in tactical units offers even greater possibilities. Not only could the information be available in a visually expressive way, but the maneuver battalion will have the capability to generate a three-dimensional index map on demand, in any scale, for any purpose. The necessary data for an area can be collected (ideally from physical field sampling, but also from a variety of maps, civilian agencies, aerial photos, or other intelligence sources), compiled, correlated and stored before it is needed, before the first battle ever begins.

Future Questions

There are, admittedly, some unanswered questions which require further study and refinement. The personal-type computer will prove adaptable to this method of trafficability analysis; all that is required is the development of an appropriate software package. The major unresolved question is: does the map provide an accurate analytical tool? Physical testing of the model was not possible due to a lack of access to the appropriate vehicles. There are, however, two divisions of mechanized forces at Fort Hood that could provide the answer. The point here is that it is possible. The technology is available, the data are easily obtainable, and the information provided appears to be applicable. One of the responsibilities in fighting outnumbered and winning is being smarter than our enemy. This particular mapping system provides some badly needed graphic interpretation to terrain accessibility and defense.

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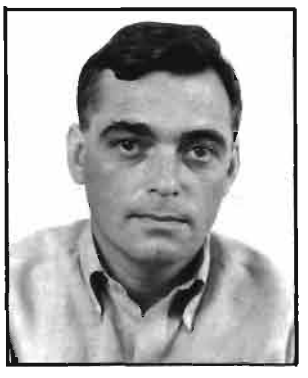

The British FV 4211, first test bed vehicle to incorporate Chobham armor.

Tank Test Beds

by Richard M. Ogorkiewicz

Although the *M1* tank is still in the early stages of its production program, it is not too early to think of its successor. One reason is the time that it takes to get a new tank into service. This is clearly illustrated by the fact that it is now 12 years since the development of the *M1* was started.

Moreover, the nature of the threats facing tanks is changing. And at the same time, the technology of tanks is advancing. There is a growing need, therefore, to develop new tank designs to respond to the changing threats and to exploit new technological opportunities. However, it is not obvious at this point in time which of the several possible designs is the most effective and which might lead, therefore, to a successor to the *M1*.

In these circumstances it is essential to explore and evaluate the most promising of the possible designs in advance of any firm commitment to proceed with the development of any one. The best way of doing this has proved to be through the construction of test bed vehicles, and it is very noteworthy that the Tank-Automotive Concepts Laboratory of the U.S. Army Tank-Automotive Command (TACOM) has initiated a Tank Test Bed program.

Nature of Test Beds

Before considering tank test beds further, it is necessary to establish clearly their nature and their value in the development of combat vehicles.

Test beds may be defined as experimental vehicles designed and built to explore and to evaluate new design concepts. This definition implies that test beds are much more than vehicles used for testing one particular component or subsystem. On the other hand, test beds are not prototypes. In other words, they are not vehicles built to prove or to demonstrate designs developed to agreed military requirements and intended to be put into production and service.

The distinction between test beds and prototypes is important, because it implies that there is no commitment in the design of test beds to put them into production and service. Consequently, test beds need not be worked out in every detail to the degree required in prototypes. This results in considerable savings in time and money. For the same reason, test beds do not require any of the elaborate program management organizations which are associated with the combat vehicles that are to go into production and field service.

The essentially tentative and exploratory nature of test beds also offers the advantage that new design concepts can be investigated without raising political issues or calling for major policy decisions.

In spite of these potential advantages, the construction of test beds might be questioned on the grounds that mathematical modeling now offers an alternative, and ostensibly more economical, way of exploring and evaluating new concepts. In fact, in spite of their undoubted value, computer models are not an alternative to test beds. One very simple reason for this is that computer models cannot anticipate all the practical problems which are bound to arise, to a greater or lesser extent, in any radically new design. What is more, many of the inputs into computer models are essentially and inevitably of a historical nature. In consequence, computer models can be of great value in optimising designs, but their value is severely limited when radically new design concepts are involved.

Need for New Designs

All this leads to the conclusion that test beds are an indispensable means of exploring and assessing new concepts. It should also be evident that the value of test beds increases with the novelty of the concepts, or with the degree to which the new designs depart from earlier ideas.

In consequence, test beds should be of particular value at the present time when, on one hand, there is a great need to advance on the traditional configuration of tanks and when, on the other hand, there are unprecedented opportunities for doing this.

One of the reasons for the great need to advance on the traditional

designs is the level of the threats now facing tanks, due to the progress in the development of antitank weapons. The capabilities of antitank weapons have increased in the past and have already led to several major changes in tank design. In particular, they have caused successive increases in armor protection, which has grown to the equivalent of more than 300 millimeters of steel over the fronts of hulls and turrets, or 20 times what it was when tanks were first built.

However, still greater increases in armor protection are required to provide tank crews with a high degree of survivability in the face of hostile tank guns firing APFSDS projectiles with long-rod penetrators, or of antitank weapons using advanced shaped charge warheads. Such increases are possible, but not without departing from the traditional configuration of tanks. For example, frontal armor could be increased to as much as 900 millimeters of steel, or the equivalent of even more, if advanced forms of protection were used, but not if tanks are to retain their traditional form with three-man turrets, which has already led to some tanks weighing as much as 62 metric tons or 68 U.S. tons.

Another reason why new design concepts are needed is the growing threat of attack not only by traditional direct-fire weapons but also from above. Until now, attack from above has been largely ignored in tank design, except for artillery shell fragments, which have not presented a major threat. But now attack from above has to be taken more seriously and will demand more than a redistribution of armor. In fact, there is no way in which armor can be redistributed to improve significantly the protection of conventional tanks against top attack. This leads, once again, to the need to depart from conventional layouts and to devise new configurations which would be less vulnerable to top attack.

So far as new configurations are concerned, the most important opportunity to devise them arises out of the development of automatic loading systems for tank guns. Until now tanks have had to have a human loader for their main armament and this has prevented major changes in the configuration of tanks for very many years. As a result, even the latest tanks, such as the U.S. *M1* and the German *Leopard 2* have basically the same configuration as the *A10E1* tank built in Britain by Vickers-Armstrong in 1934!

Now, without the need for a human loader, it is possible to design tanks which are very different from those of the past 50 years. In particular, it is now possible to have tanks with guns which are not only automatically loaded but also remotely controlled and, therefore, mounted externally on pedestals or in small-frontal-area, unmanned turrets. The advantages in either case include much smaller exposed areas in defilade positions, reduced internal volume and complete separation of ammunition from the crew.

There are also other possibilities which did not exist before. One of them arises out of the development of electro-optical vision devices, which offer much greater freedom with regard to the location of the crew within the tank. For example, indirect electro-optical vision devices make it possible to locate all crew members low in the hull where they can be better protected.

Above, a scale model of General Dynamics' tank test bed vehicle. The twin-gunned test bed vehicle below is the Krupp-MAK VT 1-1, powered by a 2050-hp engine.

Value of Test Beds

These and other opportunities call for the construction of test beds through which they may be explored and eventually assessed, not only from the technological, but also from the user points of view. In fact, test beds are essential if the user is to properly evaluate any new concepts which might be proposed in place of the configurations with which he is familiar and, ultimately, to decide whether to accept them or not. Test beds certainly offer a much more realistic and sound basis for making the decisions than any amount of paper studies, computer simulations or intuitive judgments.

Hands-on experience with test bed vehicles is also bound to suggest improvements and changes to any new design, which is unlikely to be perfect in its initial form, no matter how promising it might be. The consequent changes can be made relatively easily while the design is still at the test bed stage because of the test bed's flexible, experimental nature. In this way, new concepts can be refined or optimised before any decision is made to further develop them.

This means that test beds can serve to advance the engineering development of new concepts as well as providing a sound basis for user judgments.

Systematic programs of test bed design and construction also make it possible to nurture, relatively economically, combat vehicle design teams. They do so by providing the necessary

The British COMRES 75 test bed vehicle was built in 1968 to explore externally-mounted main guns.

continuity of work and the opportunity to develop specialist experience.

None of these conditions exist when combat vehicles are developed by a series of discontinuous vehicle programs. This mode of development inevitably leads to disbanding, or at least to the running down, of design teams in between such programs. In consequence, transfer of experience suffers and every time a new program is started much of the necessary expertise has to be newly acquired at considerable cost in time and money.

Test bed programs can also provide a reservoir of new designs which can be developed and put into service much more quickly in an emergency than any new design started from scratch. The classic example of this is the German *Tiger* of WWII. This heavy tank went into action in the remarkably short period of only 15 months from the start of its development. It did so not simply because the Germans worked very hard under the stress of wartime, but even more, because of the prior existence of experimental heavy tanks on which its design could be based.

British, German and Swedish Examples

A much more recent example of the successful use of test beds is provided by the British *FV 4211*. This battle tank test bed was built in 1970-71 to explore for the first time the use of Chobham armor in a tank design. As a result of this test bed, Chobham armor was accepted as entirely practicable and this led directly to the decision to incorporate the special armor in the General Motors and Chrysler prototypes of the *M1* tank, or *XM1* as it was then. The *FV 4211* also served as the basis for one of the designs developed as part of the abortive Anglo-German Future Main Battle Tank (FMBT) Program of the mid-1970s, and through it, to the latest British tank, the *Challenger*.

A little earlier, in 1968, the British Military Vehicles and Engineering Establishment (MVEE) built another important test bed, the COMRES 75. This consisted of an experimental vehicle with the first ever externally-mounted gun, which provided useful, practical experience with external gun installations heretofore unavailable.

Several other examples of the judicious use of test beds are also provided by the Federal Republic of Germany. The most interesting of them is probably the series of twin-gun turretless *VT-1* vehicles built during the mid-1970s by Krupp MaK. The *VT-1* test beds enabled several novel features to be explored in depth, including the twin-105-mm and 120-mm gun installations which could fire salvos for greater hit probability; firing on the move from turretless vehicles with semi-fixed gun mountings, and the effectiveness of power-to-weight ratios of more than 50 hp per metric ton. As it happens, the concepts embodied in the *VT-1* test beds have not been adopted by the German Army, but the experience gained with them fully justified their construction.

Further examples of the effective use of test beds come from Sweden. Test beds have been used in Sweden not only to explore new design concepts but to do so with a minimum of development risk and at minimum cost. This happened in the case of the *S-tank* when it was being developed in the 1950s and 1960s and much more recently with the *UDES XX 20*, which may become the forerunner of a new type of articulated tank destroyer with exceptional off-the-road capabilities.

At first sight, the *UDES XX 20* might appear to be full of technical risks, but, in fact, several of its features have been successfully validated with earlier test beds. For example, the novel way of controlling articulated vehicles embodied in it had been proven with an earlier, low-cost, 4-ton test bed. Similarly, the possibility of firing a 120-mm tank gun from a relatively light vehicle had been proven with the gun mounted on an infantry combat vehicle of approximately the same weight as the proposed tank destroyer.

The U.S. HIMAG test bed was used to study various mobility and fire control options.

U.S. Test Beds

There are also several examples of the effective use of test beds in the U.S. A particularly good recent example is the HIMAG test bed, which was built during the late 1970s as part of the Armored Combat Vehicle Technology (ACVT) Program. This test bed has been admirably suited to explore a whole range of design options, including various levels of mobility and several fire control configurations.

The latest example is represented by the Tank Test Bed (TTB), the development of which was initiated by the Tank-Automotive Concepts Laboratory of TACOM and which is being built by the General Dynamics Land Systems Division. The TTB should provide a very timely opportunity to explore several of the new possibilities in tank design, including the location of the crew in the hull for greater protection and remote control of an automatically loaded 120-mm gun.

However, the TTB program involves the construction of only two test vehicles. One is the TTB, which is intended to address a number of the technical issues, and the other is the Surrogate Research Vehicle (SRV), which carries no armament but is fully equipped with sights and controls so that it can be used to evaluate the capabilities of the three-man crew located in the hull and to resolve other operational issues.

The TTB and the SRV are bound to prove very valuable but they can only be used to explore some of the many new possibilities. There is, therefore, a very strong case for further test beds, to explore additional issues. These include the location of the crew in other than the three-abreast configuration adopted in the TTB, which may not be practicable if there is to be a high degree of side as well as frontal protection. They also include increased protection against top attack.

As both the TTB and the SRV are based on virtually standard *M1* tank chassis, there is also considerable scope for exploring new chassis designs incorporating power packs more compact than that based currently on the *AGT-1500* gas turbine.

In addition to tank test beds, there is also a strong case for one or more test beds that would serve to resolve the current conflict between the demands for arming infantry vehicles with increasingly heavier weapons and the basic purpose of these vehicles, which is to carry infantrymen. There is also a need for a test bed to explore the design of wheeled armored vehicles which would be superior to the 8x8 LAV.

All in all, there is much scope for the use of test beds. The history of their use has demonstrated that they are of considerable value in exploring and evaluating new design concepts. They have, therefore, a particularly important role to play at present, when there is a great need for new and soundly validated concepts to meet the changing situation.

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Living With Tanks

by Brigadier (Ret.) Richard E. Simpkin

(Ed. note. The following is a speech given by Brigadier (Ret.) Richard E. Simpkin, British Army, to the Thunderbolt Chapter of the Armor Association at Fort Knox, Ky.)

It's been the best part of 20 years since I did much active tanking, so it may strike you as odd that I should come to the "Home of Armor" and talk to you about living with tanks. That's how it strikes me too. But I do seem to have scored a world first in both classified and published discussion by setting out to write a book about the human side of tanking—a kind of tanker's charter, if you like (*"Human Factors in Mechanized Warfare,"* Ed.).

The idea came from a remark Major General Patton made in a very generous review of my first military book. and it gained force from talking to the Swedish designer, Sven Berge, as he was driving me from his summer house to the Swedes' armor school, and thence to Stockholm.

The problem is simple and basic. The tanker is expected to come up with skills more and more like those of a pilot while enjoying a lifestyle not too different from that of an infantryman in a wet foxhole. In the field, he mostly has to live on his tank. This can be an advantage; but often it deprives him of the comforts of farm buildings, pubs or chateaux. As the defender facing an NBC threat, he is expected to spend days buttoned-up cheek by jowl with the rest of the crew—and then to come up all bright-eyed and bushy-tailed, burning for battle.

What I want to do is to mull over some aspects of this whole problem that may not have struck you, or that you may even have deliberately shut out of your minds. This may help you to get across to designers and representatives users—trials crews and their bosses—what you actually want. The German word *benutzer freundlich* ("user-friendly") has become an "in" term in the computer world. To win battles, gentlemen, you need "user-friendly" tanks.

In the past, you may recall, I raised the delicate subject of the "deputy commander"—the guy we now call the gunner—taking over the tank or whatever in a tactical emergency. This aroused more excitement in British reviews than anything else in my book. So maybe we should take a look at discipline.

It only struck me quite recently that the form and style of tank fire orders in every army I know is based on the traditional infantry section fire order. Give them hands-off intercoms, give them override, give them computers, give them monitors—gunnery instructors still stick their heads out, lean back, and shout (or at least ours do). Compare this with the dialogue between the pilot and bombardier of a bomber—a totally different way of achieving the same thing under increasingly similar circumstances.

Many of you will have heard or read the *Bundeswehr* presentation on "mission-type control"—another of these chunks of German which has caught on. The work I've been doing for your War College in preparation for next week's symposium there leads me to think that mission-type control is both the point of departure for, and the key to, the type of warfare envisioned in FM-100-5, and the AirLand battle.

I suggest, too, that mission-type control needs to extend right down to tank-crew level. And the basis of it is trust—mutual confidence. This is what you see in a good aircrew—surely it's what you need both in the crew of a modern tank and at the lower tactical levels of command.

I don't want to pursue the C^3 aspect now, but this approach largely solves the problem of discipline within a crew forced to live in extreme intimacy and to share out the chores. As I see it, though, trying to get this balance right leads one back into the basic aims and techniques of training.

We all know the gung-hoism—"aggressive motivation" is your term for it, I think—on which the training of your own, ours and France's paratroops, along with your Marines, is based. We all know how excellently it works, too. The aims are instant obedience, extreme physical courage, toughness and stamina. Gung-hoism is fashionable in both our armies at this time. I just wonder, though, whether this is the way to build first-rate crews for machines like *M1 Abrams*.

The other option stems, I guess, from cavalry tradition and, for us British at least, from General Sir John Moore and his riflemen. Prince Philip gave it a powerful boost, under the name of "expedition training," when he was serving in the Navy. And the British Army took it up because it matched their thinking about the importance of remnants on the nuclear battlefield. Nowadays you mostly call it "evasion and escape." Just to be different, we call it "escape and evasion."

The basic technique is to provide a general physical and psychological environment in which sound men will develop their characters to the full, and be motivated to maximize their skills. Superimposed on this general environment are a series of special environments, designed to bring on particular qualities and aptitudes; to evoke particular types of crisis-response; and to give men a chance to prove themselves. These special environments need to involve a significant risk to life, and to present situations which can only be dealt with by interdependence and teamwork.

On that note, let's get back to the crew in their tank. As I mentioned this morning, I've never seen tank crews evaluated in financial terms the way aircrews are. The nearest I could get to it with ballpark figuring was that the worth of a trained crew in dollars might be around half that of their machine. But, as it's all too easy to forget in peacetime, a crew good enough to pull something out of the bag may be a battle-winning asset. And—as Afghanistan and the Middle East show—a battle-experienced tank or aircraft crew is a pearl beyond price.

Keeping Dollars in Perspective

But let's get dollar costs in perspective too. You have to set aside conventional notions and be rational here. Some of the things I suggested in my last book and am going to talk about now sound extravagant and have been criticized as such. But they're not even a flake of skin on a peanut compared to the real value of a modern tank and its crew—especially of a tank-crew system tactically deployed where it needs to be.

In a defensive posture, a retrograde movement, or any type of maneuver warfare, one needs to think very hard about *crew survival.* A well-trained tanker's instinct is to stay with his tank. But once he's unhorsed, what he really needs to do is to get away from it, and make his way back to safety. Clothing and personal kit suitable for tanking is apt to be disastrous for walking and living rough. As anybody who takes the trouble to try both for themselves can see, the two requirements are poles apart.

There just is no good compromise, but the answer is simple. Each crewman needs a survival pack—literally, a rucksack—stowed in a readily accessible outside bin. I spelled out the contents of this pack in the book. It is neither difficult nor expensive to provide an unhorsed tanker with dedicated clothing and equipment that give him the best possible chance of surviving, and rejoining his unit to fight again.

Let's now turn to the problem of getting tankers into battle really fit. As we all know, living on a tank out of

contact and away from NBC threat can be very agreeable. And so it should be. Crews that live well, fight well; and life on his tank may be the nearest a tanker in the field will get to R&R for quite a while. Fantastic as it looks at first sight, the aim should surely be to provide him with a standard of amenity and comfort equivalent to that of, say, a fast patrol boat.

Here it pays to look at the negative side first. We all know about the basic motions of a tank—roll, pitch, yaw and bounce. But there's another one I only learned about from Sven Berge three years back; and I just wonder how many of you know about it. The Swedes discovered it because the long tracked marches they do on mobilization were producing unacceptable crew fatigue. Even with rubber-shod and rubber-bushed tracks, there is a high-frequency vibration dependent on speed and the pitch of the track link. This is not consciously perceived by the crew, but is very hard to get rid of before it reaches their spines. Even with the modern emphasis on human engineering, there is, I suspect, a significant and avoidable residue of vibrations, noises, fumes, and sharp edges.

Another thing which is very bad both for morale and for physical well-being is dirt. We all know that half-inch or so of oily, gritty bilgewater that swirls around on top of the belly plate. We've all seen crews remounting literally covered in mud after replacing a track they've thrown on a muddy side-slope. When crews live for long periods in the field—as they seldom do in peacetime—diesel rash and the like become chronic. Well-trained soldiers always do their damnedest to keep themselves clean. But when you're living on a tank, with a limited water supply, in a muddy or dusty environment, it just can't be done.

If designers went out and experienced this for themselves, and then got together with experienced and articulate users, the dirt problem could be solved with minimal design or cost penalties. If you think about it, the answer is a mixture of overclothing, external bins, and thorough drills—rather like NBC decontamination, in fact.

Turning to the positive side, I want to stress that in almost all these human factors problems, military expediency and personal well-being march hand in hand. The notion that they conflict is a relic of the drill square.

Suppose, for instance, that tanks have to remain concealed in forest or mountain terrain. You can get the tank just so far into the edge of the wood or up a gully, but seldom as far as you want. Or, if you tuck it up too tight, the refueler can't get at it, or whatever. Nonetheless, with a mixture of native wit, natural materials and nets, you can hide it fairly well—as long as the crew aren't constantly moving around it.

They can get themselves a few meters further into the wood or up the gully, into complete cover. So, by giving them facilities to live in comfort off the tank, including remotes for communications, you get good concealment and a relaxed and happy crew.

Likewise, having provided good facilities for living away from the tank, it is not hard to make these adaptable for equal comfort when concealment is no problem, and ground or weather make the engine deck the best place to sleep.

In this talk I can only throw up a few examples of the ways to get tank crews into battle physically and psychologically fit. But before I turn to the much more severe problem of waiting buttoned-up under NBC threat, let me remind you once again of my fast patrol boat analogy.

In tackling the buttoned-up problem one needs to cast a pretty jaundiced eye on the term "NBC." I believe you could keep a tank crew buttoned up under armor for a week or ten days. But no way can you keep a maneuver squad or a C^3 team in their sardine can that long. There's always going to be enough warning—or at least indirect indication—of nuclear attack to get these people under armor. So what we are really talking about is a high-grade chemical threat—hydrogen cyanide and a mix of persistent and nonpersistent nerve agents. This means we can hold these large squads, or whatever, in comfort and collective protection outside armor, as long as they can mount without delay or exposure. I dealt with this in the book, but for now I'll stick to tanks and other small-crew armored vehicles.

Fact is, the problem of long waiting periods under NBC threat is one nobody cares to face up to. We all train, more or less conscientiously, to fight in protective clothing, both in armored vehicles and outside them. But we hardly even pay lip-service to the prospect of days of buttoned-up inactivity before the battle starts.

This problem of undergoing a prolonged and stressful experience before the real mission starts is, I suggest, unique to tank crews. Even divers, submariners and astronauts don't have to cope with it in quite the same way. But I'm convinced that, with future armored vehicles at least, it can be faced up to and solved on acceptable terms.

As you may have gathered, I'm not exactly a traditionalist; but as a soldier I am dead against tank crews being selected like aircrews are. By contrast, in face of a chemical threat, tank crews have to be given something very like aircrew status in the field. In simple terms, once they're in their machines, they mustn't get out again unless the risk of actual or potential contamination is zero. In my book I went into the logistic aspects of this in detail, and the thing can be made to work at no great cost to anything.

The second point before we get down to the nitty-gritty is this. Both crew and tank must leave their hiding place fit for battle. Among other things, this means the fuel and water tanks must be full. The tank's subsystems will have to be exercised and the batteries kept charged. And a plentiful water supply is maybe the greatest single factor in crew comfort.

It would be dead simple to provide fuel and water for use in the hide from a "deployment roof pack" for tanks, and a "deployment trailer" for large-crew vehicles, both to be left in the hide. The cost is relatively minute. But does any NATO army have such a thing? Has any NATO armored user asked for it?

Now let's look at the problem of three men, not of one another's choosing, cooped up in a stationary tin box for 10 days and waiting to go into action for the first time.

In terms of crew compartment layout, there are two ways of going about it. One, which arose by happy accident in our *Centurion* tank with its large loader's space, is what one might call the "solitaire game." In more recently and efficiently designed tanks, even contortionist midgets would be pushed to play this.

But in a turret-less layout, with the crew side-by-side in the hull, each crewman has a micro-home of his own. Once again I explored this in detail in the book, and I think demonstrated it could work. The key points were perhaps these.

By adapting a commercial design used in very small yachts and houseboats, a washbasin and toilet can be incorporated in each seat. Given ample water, it is simple to flush body wastes, food waste, tissues and so on out of the tank, preferably into a pit.

Next, I suggest, come modesty and privacy, along with control of light and noise. This is easily arranged by having a detachable curtain on either side of the center station; switches on the interior lamps; a lightweight induction loop earpiece with a switch on it; and a switch on the monitor unit.

Having overcome the basic drawbacks, one can start getting positive. And once again I'd like to stress the way military requirements and amenities go hand in hand.

It would cost only a few dollars to build into the radio installation a simple VHF/FM broadcast receiver and a changeover switch to put broadcast programs onto one of the subsidiary channels of the harness. With suitable precautions over electronic and verbal security, commanders could use this facility for briefing and morale-boosting.

You'll almost certainly have an audio cassette player in the tank to handle the software for the on-board computer. Link this to the amplifier of the broadcast receiver, and you have a typical car radio facility for free.

Likewise, throw in a hundred dollars or so of videotape playback as an input to the image processor system, and it's getting to be real home away from home. These audio and video aids can also be used for silent training of many kinds, likewise for silent exercising of the vehicle subsystems.

And so you come to what I see as the clue to going out of hides into battle with fit crews in fit tanks. With these facilities and aids, you can put together a routine of living, training, and maintenance not too different from the soldier's normal day. Given this, I reckon one could stay in hides for as long as 10 days without needing support from drugs.

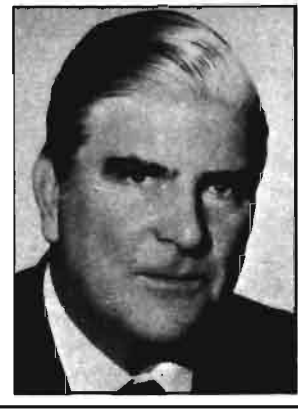
Let me close on this aspect with another example of the kind of thinking I'm out to provoke. One thing I didn't cover was physical exercise. This would have to be mainly isometric. But isometric exercises are boring, and can be damaging unless they are tuned to the individual's physique. So why not make one of the perks of qualifying as a crewman a videotape of an individual isometric program worked out and recorded by an attractive and supportive physical education instructress. Well, why not? This personalized and animated pin-up would cost only a few dollars and take up only a few cubic inches of stowage space.

In the Nineties, if not now, the problem of living with tanks, even of lying up in hides under NBC threat, can be licked in practicable and affordable ways. Following the same line of thought, you can go on to make sure you go into battle with fit, highly-trained, and highly-motivated crews. All that is needed is a mental somersault in the minds that matter. And for NATO I guess that means right here at the "Home of Armor." Sure, there will be a battle with designers, with financiers, with traditionalists, regrettably even with some who have been brought up on tanks but have forgotten the view from the cupola.

May I leave you with just one thought which, for me at least, clinches the issue. What matters about a tank is not the performance which is designed and engineered into it. It is not the performance that a hand-picked trials crew, living in comfort and backed by all the facilities of Fort Knox or Aberdeen, can get out of it.

It is what a slightly below-par regular crew can do with their machine after they—and it—have spent several weeks in a landing ship, disembarked through surf, rolled for a week across desert in summer, and sat buttoned-up for another week in a mountain gully.

RICHARD SIMPKIN, whose long British Army career includes wartime service in the Middle East, later had extensive responsibility for armored vehicle development, including involvement in the Chieftain, Scorpion, and Anglo-German MBT programs. A frequent *ARMOR* contributor, he is the author of several recent books on armor-related topics.



Toward an Old Way of Thinking

by First Lieutenant Geoffrey C. Davis

It is time to place "maneuver warfare" in its proper perspective. In their eagerness to talk about a "new" approach to war, casting aside the rigid methods of the firepower-attrition approach, the new prophets of maneuver warfare are on the verge of falling into the same trap as the advocates of firepower-attrition.

Firepower and *maneuver* are *not* separate entities. In defining these concepts as such, we have essentially separated the soul from the man. Neither firepower alone nor maneuver alone can win wars. The two must be integrated to provide the most flexibility to the commanders. One must maneuver his force in such a way as to gain an advantage over the enemy and then to bring overwhelming firepower on the enemy at that point which is deemed to be the focus of his combat efforts. Thus, firepower and maneuver work together, not separately. Hence, firepower is the handmaiden of maneuver. One does not exist without the other.

Firepower

Firepower is essentially a unit's ability to punish and kill an enemy. One maneuver-warfare enthusiast describes firepower as basically a "fear producer." He says that artillery, for example, spreads a disruptive fear effect through enemy infantry. Wrong! Fear is a part of it, but only a small part. We must remember that firepower kills and punishes. Major General Trainer was right when he said, "war is a killing game." Killing, whether we like it or not, is a part of the struggle.

Maneuver

Effective *maneuver* can usually be generalized as striking enemy weak points in order to capitalize on the enemy's situation, exploiting the effect of surprise to disrupt and ultimately defeat him.

Because the current notion of maneuver warfare has often been likened to a game of chess, it may be misinterpreted. The maneuver of forces to take advantage of one's enemy is necessary. The goal is to assault into his rear and cut his lines of communication, sending him reeling back more quickly than he can respond to an attacker's thrusts, and ultimately resulting in his defeat.

In *Patterns of Conflict,* Colonel John P. Boyd, USAF (Ret.), stressed that combat is basically a series of decision "loops" focusing on observation of an opponent, orientation toward that opponent, the decision to act, and, finally, the action against him. Colonel Boyd argues that in effective combat, one closes the loop more quickly than his enemy. Hence, an opponent would be beaten when he became disoriented.

The Boyd Cycle emphasized that defeat occurs at that point when an enemy realizes that he can no longer effectively respond to the rapidly changing situation. In other words, when the opponent psychologically believes he cannot respond, then he *is* defeated. Yet, more must be read into this process of defeat than disorientation. Because of the sheer rationality of the Boyd model, one might assume that a battle is a situation in which rational men decide that defeat is imminent because they have been strategically outmaneuvered and, therefore, must surrender.

Men surrender when their means to resist are negated. The goal of tactics, then, is to diminish the enemy's ability to resist by presenting him with the clear perception that to fight on would mean futile death before an overwhelming situation.

But, what does one do when the enemy sees that his situation may be hopeless, by our standards, and still persists in fighting? Common sense and rationality should tell him he has been outmaneuvered and that further resistance is futile. But, sometimes men stand and fight willingly to the death in the face of certain defeat. If maneuver warfare is not then integrated into an overall concept of combat, including firepower, it will break down hopelessly.

Integration of Firepower and Maneuver

During July 1942, the 11th and 19th *Panzer* Divisions advanced to the Ressetta River in western Russia. They were preceded by two infantry divisions that were to make the breach through which the mechanized forces would pass.

As the lead elements of the 19th *Panzer* attacked northwestward out of Khalmiskchi, they ran into well-placed Soviet antitank defenses that were constructed in depth, often using dummy positions between points of concealed and covered antitank guns. During the early phases of the attack, elements of the 19th *Panzer* Division would

turn their tanks to decoys and expose their tracks and lateral armor to fire. Finally, the armor moved out of the PAK (antitank) front and neared the forest area north of Nikitskoye. The Soviets used small groups of five to seven tanks to assault out of the forest on the German left flank and disrupt the racing German armor.

Because his tanks were older models, the Soviet commander *maneuvered* his forces to strike the German wheeled supply and troop-carrying vehicles following the tanks. The Soviet technique was effective in slowing the German's rush because the German commander was forced to commit a *panzer* battalion to cover his left flank. The *panzer* battalion was echeloned in depth and supported by armored engineers. This movement of the armored firepower to the German left flank was necessary to keep the division's attack moving. The German commander used a large part of his *firepower* to protect his left flank rather than letting the tanks race ahead and leave the still effective Soviet troops intact and in his rear. The 19th *Panzer* Division used the *integration of its armored firepower and maneuver* capability to continue its drive unimpeded north to Glinnaya.

On the other side of the sector, the 11th *Panzer* Division attacked northeastward from Wyanova and encountered heavy flanking fires from roaming groups of Soviet *T-34s* and also from heavy *KV* tanks which were in hull defilade positions. The Russian tanks were positioned in, or moved through, the gullies on the flanks of the German attack. The excellent use of terrain by the Soviets delayed the armored assault and forced the 11th *Panzer's* commander to employ concentrations of antitank and artillery fire to disrupt the hit-and-run operations of the Russians.

The available fire support failed to disrupt the Russian attacks so the division commander asked for air support and received reconnaissance aircraft supported by fighters. This enabled the German forces to regain their momentum, because the aerial observers radioed Soviet armor positions directly to the German tank commanders. Because of this move, the Germans were able to react more quickly to the situation, disorient the Russians, and cause them heavy losses.

At this point, the Germans had employed *maneuver* in the form of increased reconnaissance in order to better concentrate their *firepower* on the Soviet tanks. Later, when the 11th *Panzer* Division neared Kilosovo, the lead elements came under intense counterattack from about 20 *T-34s* in the forest on the German's left. The bulk of the German armor swung left toward the forest. As it did so, an entire brigade of *T-34s* broke out of Polyana west of Kilosovo, assaulting the German flank and rear. Excellent Soviet operational coordination caused the see-saw battle over Kilosovo to continue until the German commander massed all of his artillery and antitank guns to secure a hold on the town. He relied on *firepower* to tip the balance because the *maneuver* effort of his armor had been effectively countered by the Soviet armored brigade. The Soviet maneuver took advantage of the lack of German reconnaissance in most sectors in order to place concentrations of tanks in various positions along the German axis of advance.

The battle for the Ressetta River gives lie to the doctrinaire approach of much maneuver theorizing. Both the German and Russian commanders had balanced forces and were consequently able to integrate fire and maneuver. In fact, the Germans ultimately found that they had to rely on their firepower more than on their maneuver capability to consolidate their gains, especially outside Kilosovo.

This action, like many of the yet-unlearned lessons from WW II, shows that there is more to fluid combat then moving troops and guns about the battlefield. Like the Germans at Ressetta, modern day commanders will have to use every available asset to strike a balance between the two, a balance that best suits the focus of the operation.

In the long run, it is wrong to say that war *should be* exclusively maneuver-oriented or firepower-oriented. What maneuver *ought* to be defined as is more of a way of thinking than as a "doctrine." The principal that dominates successful doctrine is the proper *integration* of *firepower* and *maneuver,* based on capabilities and perceptions of a given situation, in order to accomplish a mission.

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The Armored Regiments of

by Captain Thomas D. Dinack

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Armored units were first organized in the U.S. Army in 1918 and for the majority of the history of the U.S. Armored Force the battalion has been the primary tactical formation for tank units. Unlike such nations as Germany, Russia and Britain, the United States has rarely organized armored regiments. One of the few periods when armored regiments were active in the U.S. Army was during the early years of World War II. Armored regiments were organized in 1940 as organic units of the new armored divisions which were being formed. The purpose of this article is to provide some basic information on the origins, service, and eventual dispositions of the armored regiments which served during the Second World War.

As initially organized each armored division had a single armored brigade consisting of two light armored regiments and one medium armored regiment.[1] The first two armored divisions organized in 1940 were, appropriately enough, the 1st and 2nd. The 1st Armored Division was formed at Fort Knox, Kentucky, from the 7th Mechanized Cavalry Brigade, which had been the Cavalry branch's experimental mechanized unit during the 1930s. On 15 July 1940 the 7th Cavalry Brigade's 1st and 13th Cavalry Regiments were redesignated respectively as the 1st and 13th Regiments and were assigned to the 1st Armored Division as the division's two light armored regiments. The 3rd Battalion, 67th Armored Regiment (Medium) at Fort Benning provided the personnel to form the Division's 69th Armored Regiment (Medium).

The 2nd Armored Division was formed at Fort Benning, Georgia, on 15 July 1940 using infantry tank

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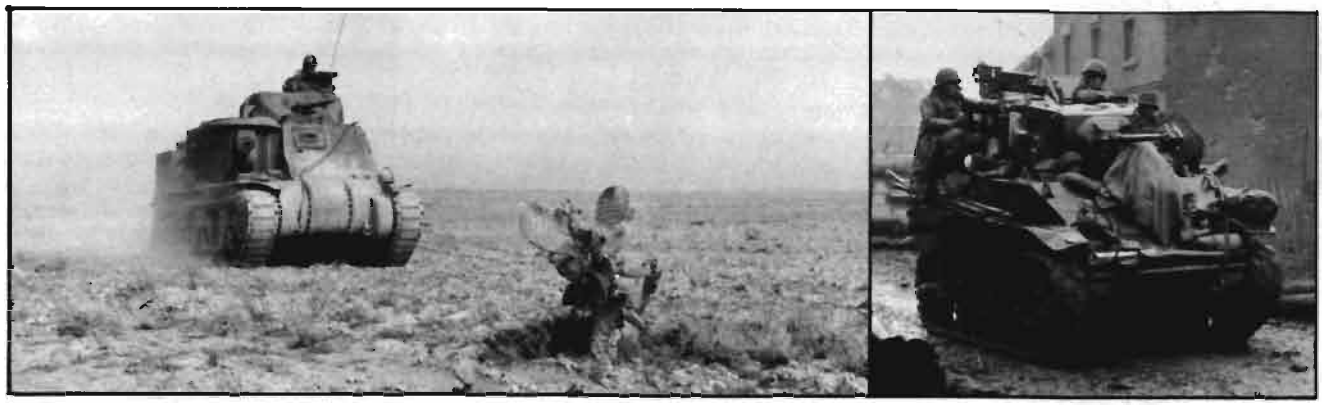
units. The 66th, 67th, and 68th Infantry Regiments (Tank) were redesignated, respectively as the 66th, 67th, and 68th Armored Regiments and assigned to the 2nd Armored Division; the 66th and 68th were light regiments while the 67th was the division's medium regiment. Many of these units were not stationed at Fort Benning prior to the activation of the 2nd Armored Division and a number of personnel and equipment movements and exchanges between the units which formed the 1st and 2nd Armored Divisions occurred during 1940.

Three more armored divisions were activated using the three armored regiment per division structure. On 15 April 1941 the 3rd Armored Division was organized at Camp Polk, Louisiana, with a cadre of personnel from the 2nd Armored Division; the new division had the 2nd and 3rd Armored Regiments (light) and the 4th Armored Regiment (Medium). On the same day, a cadre from the 1st Armored Division was used to

Armd Regt.	Assignment and Date Broken Up	Disposition		Remarks
1st	1AD (20 Jul 44)	Regt(-2Bn)	1 Tk Bn	Fought in Italy with 1AD
		2 Bn	Disbanded	
2nd	9AD (9 Oct 43)	Regt (-)	2 Tk Bn	Fought in NW Europe with 9 AD
		1 Bn	776 Tk Bn	Fought in Pacific as 776 Amphib Trac Bn
		3 Bn	19 Tk Bn	Fought in NW Europe with 9 AD
3rd	10AD (20 Sep 43)	Regt (-)	3 Tk Bn	Fought in NW Europe with 10 AD
		1 Bn	777 Tk Bn	Fought in NW Europe as separate Tk Bn
		3 Bn	21 Tk Bn	Fought in NW Europe with 10 AD
5th	16AD (3 Sep 43)	Regt(-)	5 Tk Bn	Fought in NW Europe with 16 AD
		1 Bn	717 Tk Bn	Fought in NW Europe as separate Tk Bn
		3 Bn	26 Tk Bn	Fought in NW Europe with 16 AD
9th	20AD (10 Sep 43)	Regt(-)	9 Tk Bn	Fought in NW Europe with 20 AD
		1 Bn	718 Tk Bn	Fought in Pacific as 718 Amphib Trac Bn
		3 Bn	27 Tk Bn	Fought in NW Europe with 20 AD
11th	10AD (20 Sep 43)	Regt(-)	11 Tk Bn	Fought in NW Europe with 10 AD
		3 Bn	712 Tk Bn	Fought in NW Europe as separate Tk Bn
13th	1AD (20 Jul 44)	Regt(-)	13 Tk Bn	Fought in Italy with 1 AD
		1 Bn	Disbanded	
		3 Bn	4 Tk Bn	Fought in Italy with 1AD
14th	9AD (9 Oct 43)	Regt(-)	14 Tk Bn	Fought in NW Europe with 9 AD
		3 Bn	711 Tk Bn	Fought in Pacific as separate Tk Bn
16th	16AD (10 Sep 53)	Regt(-)	16 Tk Bn	Fought in NW Europe with 16 AD
		3 Bn	787 Tk Bn	Fought in NW Europe as separate Tk Bn
20th	20AD (10 Sep 43)	Regt(-)	20 Tk Bn	Fought in NW Europe with 20AD
		3 Bn	788 Tk Bn	Fought in Pacific as 788 Amphib Trac Bn
		1 Bn	774 Tk Bn	Fought in NW Europe as separate Tk Bn
		3 Bn	17 Tk Bn	Fought in NW Eurone with 7 AD
31st	7AD (20 Sep 43)	Regt(-)	31 Tk Bn	Fought in NE Europe with 7 AD
34th	5AD (20 Sep 43)	Regt(-)	34 Tk Bn	Fought in NW Europe with 5 AD
		1 Bn	772 Tk Bn	Fought in NW Europe as separate Tk Bn
		3 Bn	10 Tk Bn	Fought in NW Europe with 5 AD
35th	4AD (10 Sep 43)	Regt(-)	35 Tk Bn	Fought in NW Europe with 4 AD
		1 Bn	771 Tk Bn	Fought in NW Europe as separate Tk Bn
		3 Bn	8 Tk Bn	Fought in NW Europe with 4 AD
36th	8AD (20 Sep 43)	Regt(-)	36 Tk Bn	Fought in NW Europe with 8 AD
		1 Bn	775 Tk Bn	Fought in Pacific as separate Tk Bn
		3 Bn	18 Tk Bn	Fought in NW Europe with 8 AD
37th	4AD (10 Sep 43)	Regt(-)	37 Tk Bn	Fought in NW Europe with 4 AD
		2 Bn		*See Note
		3 Bn	706 Tk Bn	Fought in Pacific as separate Tk Bn
40th	7AD (20 Sep 43)	Regt(-)	40 Tk Bn	Fought in NW Europe with 7 AD
		2 Bn		*See Note
		3 Bn	709 Tk Bn	Fought in NW Europe as separate Tk Bn
41st	11AD (20 Sep 43)	Regt(-)	41 Tk Bn	Fought in NW Europe with 11 AD
		1 Bn	778 Tk Bn	Fought in NW Europe as separate Tk Bn
		3 Bn	22 Tk Bn	Fought in NW Europe with 11 AD
42nd	11AD (20 Sep 43)	Regt(-)	42 Tk Bn	Fought in NW Europe with 11 AD
		3 Bn	713 Tk Bn	Fought in Pacific as 712 Tk Bn (Flame T)
43rd	12AD (11 Nov 43)	Regt(-)	43 Tk Bn	Fought in NW Europe with 12AD
		1 Bn	779 Tk Bn	Never saw combat
		3 Bn	23 Tk Bn	Fought in NW Europe with 12 AD
44th	12AD (11 Nov 43)	Regt(-)	44 Tk Bn	Fought in Pacific as separate Tk Bn
		3 Bn	714 Tk Bn	Fought in NW Europe with 12 AD
45th	13AD (20 Sep 43)	Regt(-)	45 Tk Bn	Fought in NW Europe with 13 AD
		1 Bn	780 Tk Bn	Fought in Pacific as 780 Amphit Trac Bn
		3 Bn	24 Tk Bn	Fought in NW Europe with 13 AD
46th	13AD (20 Sep 43)	Regt(-)	46 Tk Bn	Fought in NW Europe with 13 AD
		3 Bn	715 Tk Bn	Fought in Pacific as 715 Amphib Trac Bn
47th	14AD (20 Sep 43)	Regt(-)	47 Tk Bn	Fought in NW Europe with 14 AD
		1 Bn	786 Tk Bn	Fought in NW Europe as separate Tk Bn
		3 Bn	25 Tk Bn	Fought in NW Europe with 14 AD
48th	14AD (20 Sep 43)	Regt(-)	48 Tk Bn	Fought in NW Europe with 14 AD
		3 Bn	716 Tk Bn	Fought in Pacific as separate Tk Bn
68th	6AD (20 Sep 43)	Regt(-)	68 Tk Bn	Fought in NW Europe with 6 AD
		1 Bn	773 Tk Bn	Fought in Pacific as 773rd Amphib Trac
		3 Bn	15 Tk Bn	Fought in NW Europe with 6 AD
69th	6AD (20 Sep 43)	Regt(-)	69 Tk Bn	Fought in NW Europe with 6 AD
		2 Bn		*See Note
		3 Bn	708 Tk Bn	Fought in Pacific as 708 Amphib Trac Bn
80th	8AD (20 Sep 43)	Regt(-)	80 Tk Bn	Fought in NW Europe with 8 AD
		3 Bn	710 Tk Bn	Fought in Pacific as separate Tk Bn
81st	5 AD (20 Sep 43)	Regt(-)	81 Tk Bn	Fought in NW Europe with 5 AD
		3 Bn	707 Tk Bn	Fought in NW Europe as separate Tk Bn

*Note—For these regiments, the 2nd Bn (- Co D) was absorbed into the Battalion which resulted from the redesignation of the Regt(-) e.g. 2nd Bn, 37th Armd Regt absorbed into 37 Tank Bn.

Figure 3. Reorganization of Armored Regiments, Sept. 1943—July 1944.



activate the 4th Armored Division at Pine Camp, New York. The 4th Armored Division was assigned the 5th and 7th Armored Regiments (Light) and the 8th Armored Regiment (Medium). These initial designations for the regiments of 3rd and 4th Armored Divisions lasted less than a month and on 8 May 1941, the following redesignations took place:

Figure 1. Armored Regiment Redesignations, 8 May 1941

2nd Armd Regt (3rd AD) — 32nd Armd Regt
3rd Armd Regt (3rd AD) — 33rd Armd Regt
4th Armd Regt (3rd AD) — 40th Armd Regt
5th Armd Regt (4th AD) — 35th Armd Regt
7th Armd Regt (4th AD) — 37th Armd Regt
8th Armd Regt (4th AD) — 80th Armd Regt

The final armored division organized under the three-regiment-per-division structure was the 5th. It was activated at Fort Knox on 1 October 1941, with the 31st, 34th, and 81st Armored Regiments, the 81st being the division's medium regiment.

Figure 2. Armored Regiments, 9 May 1941—31 December 1941

Armored Regiment	Assignment
1st	1st AD
13th	1st AD
31st[2]	5th AD
32nd	3rd AD
33rd	3rd AD
34th[2]	5th AD
35th	4th AD
37th	4th AD
40th	3rd AD
66th	2nd AD
67th	2nd AD
68th	2nd AD
69th	1st AD
80th	4th AD
81st[3]	5th AD

During the first 10 days of 1942 the armored divisions were reorganized, each now consisted of two armored regiments, with each regiment having one light tank battalion and two medium tank battalions. The armored brigade headquarters were designed to act as tactical headquarters controlling the division's combat units.[3] The "extra" armored regiments created by this reorganization, the 31st, 40th, 68th, 69th, and 80th, were all inactivated; however, they were all reactivated within three months and assigned to the new armored divisions being organized.

Nine new armored divisions were activated during 1942. The 6th and 7th were composed of the extra regiments created during the January 1942 reorganization, while the 8th Armored Division had one "extra" regiment and one newly organized one:

6th Armored Division — Activated 15 February 1942, Fort Knox — 68th and 69th Armored Regiments

17th Armored Division —Activated 2 March 1942, Camp Polk — 31st and 40th Armored Regiments

8th Armored Division — Activated 1 April 1942, Fort Knox —36th and 80th Armored Regiments

The 9th and 10th Armored Divisions were activated on 15 July 1942.

To create the new units, four of the Regular Army cavalry regiments—the 2nd, 3rd, 11th and 14th—were inactivated and their personnel and equipment were used to concurrently activate the 2nd 3rd, 11th, and 14th Armored Regiments.

9th Armored Division — Activated 15 July 1942, Fort Riley, Kansas — 2nd and 14th Armored Regiments

10th Armored Division —Activated 15 July 1942, Fort Benning — 3rd and 11th Armored Regiments

During the next four months, four more armored divisions were activated, each consisting of newly constituted armored regiments with no previous history:

11th Armored Division — Activated 15 August 1942, Camp Polk — 41st and 42nd Armored Regiments

12th Armored Division — Activated 15 September 1942, Camp Campbell, Kentucky - 43rd and 44th Armored Regiments

13th Armored Division — Activated 15 October 1942, Camp Beale, CA — 45th and 46th Armored Regiments

14th Armored Division — Activated 15 November 1942, Camp Chaffee, AR — 47th and 48th Armored Regiments

The U.S. Army's last two armored divisions, the 16th and 20th, were activated in 1943:

20th Armored Division — Activated 15 March 1943, Camp Campbell — 9th and 20th Armored Regiments

16th Armored Division — Activated 15 July 1943, Camp Chaffee — 5th and 16th Armored Regiments.

By July 1943 the 1st and 2nd Armored Divisions with their constituent armored regiments, had seen combat against the Axis. The 2nd Armored Division, with the 66th and 67th Armored Regiments, had been part of the Allied invasion of North Africa in November 1942 and had then gone on to fight in Sicily in July 1943. The 1st Armored Division, with its 1st and 13th Armored Regiments, fought in Tunisia, where they took quite a mauling from the German Army at Kasserine Pass.

In the Fall of 1943 a major reorganization of the armored division took place which eliminated the armored regiment and replaced it with the tank battalion as the primary tactical armor unit. Prior to this reorganization each armored division had two armored regiments (three battalions each) and one armored infantry regiment (three battalions), giving it a 2:1 ratio of tanks to infantry. The reorganization

eliminated all regiments and gave the division a balanced organization of three tank battalions.[5] The two combat command headquarters were retained to control the division's units and a third combat command headquarters, designated Combat Command R (Reserve), was added.

This reorganization was applied to 13 of the 16 armored divisions in the Fall of 1943. The 1st Armored Division, which was engaged in battle in Italy, did not reorganize until July 1944. For some reason, the 2nd and 3rd Armored Divisions were not reorganized under the new structure until after the war and hence are sometimes referred to as "Heavy Armored Divisions" in light of their greater tank strength.

Prior to the 1943 reorganization, each armored regiment had a headquarters and headquarters company, three tank battalions, and reconnaissance, service and maintenance companies. In addition, most regiments had a band.

The reorganization was carried out in a fairly uniform manner in each division. Typically, one of the armored regiments was used to produce three tank battalions. The regimental headquarters and second battalion were redesignated as a tank battalion with the same numerical designation as the regiment, and remained assigned to the division. The regiment's first battalion was given a new designation in the 700s and was relieved from assignment to the division, while the 3rd battalion was given a new designation under fifty and remained assigned to the division.

In the division's other armored regiment, the regimental headquarters and 1st and 2nd battalions were used to produce one tank battalion with the same numerical designation as the regiment, which remained assigned to the division, while the 3rd battalion received a new designation in the 700s and was relieved from assignment to the division. In each regiment, the

Old Unit	New Unit
66th Armd Regt	
HQ and HQ Co	
1st Bn HQ and HQ Co, Svc Co, Med Det	66th Tank Bn
Companies A-D	
2nd Bn HQ and HQ Co	
3rd Bn HQ and HQ Co	6th Tank Bn[6]
Companies E, F	
Reconnaissance Co	Trp D, 82nd Mecz Cavalry Recon Sqdn
Service Co	Svc Co, 12th Armd Inf Bn
Band	Band, 2nd Armd Div
Maintenance Co	
Companies G-I	Disbanded
67th Armd Regt	
HQ and HQ Co	
3rd Bn HQ and HQ Co	67th Tank Bn
Companies D, G-I	
Companies A, C	Cos D, C, 6th Tank Bn[7]
Reconnaissance Co	Trp E, 82nd Mecz Cavalry Recon Sqdn

Note: Remaining elements were disbanded.

Figure 4. Reorganization of 2d AD, March, 1946.

Old Unit	New Unit
2nd Armd Regt (Less elements listed below)	32nd Tank Bn
2nd Bn HQ and HQ Co	
Companies B, G	HHC Cos D + A, 7th Tk Bn
Reconnaissance Co	Trp D, 83d Mecz Cavalry Recon Sqdn
Service Company	Svc Co, 12th Armd Inf Bn
3rd Bn HQ and HQ Company	
Companies C, H, I	Disbanded — Reconstituted 28 May
Maintenance Co	1948, redesignated 61st Heavy Tank Bn
33rd Armd Regt (less elements listed below	33rd Tank Bn
3rd Bn HQ and HQ Co	Svc Co. Cos B + C, 7th Tank Bn
Companies G, H	
Reconnaissance Co	Trp E, 83rd Mecz Cavalry Recon Sqdn
Maintenance Co	Disbanded
2nd Bn HQ and HQ Co	Disbanded — Reconstituted 28 May
Companies B, C, I	1948, redesignated 62nd Heavy Tank
Service Co	Bn

Figure 5. Reorganization of 3d AD, July, 1947.

reconnaissance company became a part of the division's cavalry reconnaissance squadron, while the band, maintenance and service companies were disbanded. There were, however, exceptions — see the 1st, 13th, 37th, 40th, 44th and 69th Armored Regiments.

The 1st Armored Division's 1st and 13th Armored Regiments were awarded the following campaign participation credits prior to their reorganization as tank battalions in 1944:

Algeria-French Morocco (with Arrowhead)
Tunisia
Naples-Foggia

The 2nd and 3rd Armored Divisions fought throughout the campaigns in northwest Europe under the regimental structure and were not broken up until after the end of the war. The 2nd Armored Division's 66th and 67th Armored Regiments earned the following campaign participation credits:

Algeria-French Morocco (with Arrowhead)
Sicily[6]
Normandy
Northern France
Rhineland
Ardennes-Alsace
Central Europe

The 3rd Armored Division's 32nd and 33rd Armored Regiments received the following campaign participation credits:

Normandy
Northern France
Rhineland
Ardennes-Alsace
Central Europe

The 2nd Armored Division was the only armored division retained in the Active Army following World War II; it returned from overseas to Camp Hood in early 1946 and was reorganized in March of that year.

The 3rd Armored Division was inactivated in Germany in November of 1945 without reorganizing its regiments into battalions. The 32nd and 33d Armored Regiments were finally broken up "on paper" (since neither was active, no actual reorganization took place) on 7 July 1947.

With the reorganizations of the 2nd and 3rd Armored Divisions the armored regiment disappeared from the rolls of the United States Army, permanently replaced by the battalion as the primary tactical unit of the Armor branch.

In figure 6, each regiment is listed in the "Armored Regiment" column. Where a given designation is listed twice, the two units were not historically connected (e.g. the two different 2nd Armored Regiments). For regiments created by the redesignation of another unit, the "Origin" column will

Armd Regt	Origin		Assignment	Disposition
1st	1st Cav Mecz	(15 Jul 40)	1 AD (15 Jul 40-20 Jul 44)	Broken Up 20 Jul 44
2nd	C. 13 Jan 41	A. 15 Apr 41	3AD (13 Jan 42-8 May 41)	R. 32 Armd Regt 8 May 41
2nd	C. 11 Jul 42	A. 15 Jul 41	9AD (11 Jul 42-9 Oct 43)	Broken Up 9 Oct 43
3rd	C. 13 Jan 41	A. 15 Apr 41	3AD (13 Jan 41-8May 41)	R. 33 Armd Regt 8 May 41
3rd	C. 11 Jul 42	A. 15 Jul 42	10AD (11 Jul 42-20 Sep 43)	Broken Up 20 Sep 43
4th	C. 13 Jan 41	A. 15 Apr 41	3AD (13 (Jan 41-8 May 41)	R. 40 Armd Regt 8 May 41
5th	C. 13 Jan 41	A. 15 Apr 41	4AD (13 Jan 41-8 May 41)	R. 35 Armd Regt 8 May 41
5th	C. 14 Jan 43	A. 15 Jul 43	16AD (15 Jul 43-3 Sep 43)	Broken Up 3 Sep 43
7th	C. 13 Jan 41	A. 15 Apr 41	4AD (13 Jan 41-8 May 41)	R. 37 Armd Regt 8 May 41
8th	C. 13 Jan 41	A. 15 Apr 41	4AD (13 Jan 42-8 May 41)	R. 80 Armd Regt 8 May 41
9th	C. 24 Nov 42	A. 15 Mar 43	20AD (15 Mar 43-10 Sep 43)	Broken Up 10 Sep 43
11th	C. 11 Jul 42	A. 15 Jul 42	10AD (11 Jul 42-20 Sep 43)	Broken Up 20 Sep 43
13th	13th Cav Mecz	(15 Jul 4)	1AD (15 Jul 40-20 Jul 44)	Broken Up 20 Jul 44
14th	C. 11 Jul 42	A. 15 Jul 42	9AD (11 Jul 42-9 Oct 43)	Broken Up 9 Oct 43
16th	C. 14 Jan 43	A. 15 Jul 43	16AD (15 Jul 43-10 Sep 43)	Broken Up 10 Sep 43
20th	C. 24 Nov 42	A. 15 Mar 43	20AD (15 Mar 43-10 Sep 43)	Broken Up 10 Sep 43
31st	C. 28 Aug 41	A. 1 Oct 41	(28 Aug 41—Jan 42)	
			7AD (2 Mar 42-20 Sep 43)	Broken Up 20 Sep 43
32nd	2nd Armd Regt	(8 May 41)	3AD (8 May 41-7 Jul 47)	Inactivated 10 Nov 45
				Broken Up 7 July 47
33rd	3rd Armd Regt	(8 May 41)	3AD (8 May 41-7 Jul 47)	Inactivated 10 Nov 45
				Broken Up 7 July 47
34th	C. 28 Aug 41	A. 1 Oct 41	5AD (28 Aug 41-20 Sept 43)	Broken Up 20 Sep 43
35th	5th Armd Regt	(8 May 41)	4AD 98 May 41-10 Sep 43)	Broken Up 10 Sep 43
36th	C. 1 Apr 42	A. 1 Apr 42	8AD (1 Apr 42-20 Sep 43)	Broken Up 20 Sep 43
37th	7th Armd Regt	(8 May 41)	4 AD (8 May 41-10 Sep 43)	Broken Up 10 Sep 43
40th	4th Armd Regt	(8 May 41)	3AD (8 May 41-1 Jan 41)	
			7AD 92 Mar 42-20 Sep 43)	Broken Up 20 Sep 43
41st	C. 25 Jul 42	A. 15 Aug 42	11AD (25 Jul 42-20 Sep 43)	Broken Up 20 Sep 43
42nd	C. 25 Jul 42	A. 15 Aug 42	11AD (15 Aug 40-20 Sep 43)	Broken Up 20 Sep 43
43rd	C. 7 Jul 42	A. 15 Sep 42	12 AD (7 Jul 42-11 Nov 43)	Broken Up 11 Nov 43
44th	C. 7 Jul 42	A. 15 Sep 42	12 AD (7 Jul 42-11 Nov 43)	Broken Up 11 Nov 43
45th	C. 7 Jul 42	A. 15 Oct 42	13AD (15 Oct 42-20 Sep 43)	Broken Up 20 Sep 43
46th	C. 7 Jul 42	A. 15 Oct 42	13 AD (15 Oct 42-20 Sep 43)	Broken Up 20 Sep 43
47th	C. 31 Aug 42	A. 15 Nov 42	14AD (15 Nov 42-20 Sep 43)	Broken Up 20 Sep 43
48th	C. 31 Aug 42	A. 15 Nov 42	14AD (31 Aug 42-20 Sep 43)	Broken Up 20 Sep 43
66th	66th Inf (Lt Tk)	(15 Jul 40)	2AD (15 Jul 40-25 Mar 46)	Broken Up 25 Mar 46
67th	67th Inf (Med Tk)	(15 Jul 40)	2AD (15 Jul 40-25 Mar 46)	Broken Up 25 Mar 46
68th	68th Inf (Lt Tk)	(15 Jul 40)	2AD (15 Jul 40-8 Jan 42)	Inactivated 8 Jan 42
		A. 15 Feb 42	6AD (15 Feb 42-20 Sep 43)	Broken Up 20 Sep 43
69th	C. 15 Jul 40	A. 31 Jul 40	1AD (15 Jul 40-15 Feb 42)	Inactivated 10 Jan 42
		A. 15 Feb 42	6AD (15 Feb 42-20 Sep 43)	Broken Up 20 Sep 43
80th	8th Armd Regt	(8 May 41)	4AD (8 May 41-1 Apr 42)	Inactivated 5 Jan 42
		A. 1 Apr 42	8AD (1 Apr 42-20 Sep 43)	Broken Up 20 Sep 54
81st	C. 28 Aug 41	A. 1 Oct 41	5AD (28 Aug 41-20 Sep 43)	Broken Up 20 Sep 43

Figure 6. U.S. Armored Regiments Compendium

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list the old unit designation and date of redesignation (e.g. 1st Armored Regiment created by redesignation of 1st Cavalry, Mechanized on 15 July 1940.) For regiments newly activated, "C . . . ." is the date of constitution and "A . . . ." the date of activation. (e.g. 9th Armored Regiment constituted 24 Nov 42 and activated 15 Mar 43.) The "Assignment" column lists the unit the regiments were assigned to and the period ("AD" — Armored Division). The "Disposition" column gives the eventual fate of the regiments, whether broken up, inactivated, or redesignated ("R . . . ." giving the new designation) and the date.

One Example

The 8th Armored Regiment was constituted and assigned to the 4th Armored Division on 13 Jan 41 and activated on 15 Apr 41. On 8 May 41 the regiment was redesignated the 80th Armored Regiment. Moving to the entry for the 80th Armored Regiment, we see it resulted from the redesignation of the 8th Armored Regiment on 8 May 41 and that the new regiment continued to be assigned to the 4th Armored Division. On 5 June 42 the 80th Armored Regiment was inactivated. Coming back to the second (lower entry in the "Origin" column) we see the 80th was reactivated on 1 Apr 42; also on this date the regiment was relieved from assignment to the 4th Armored Division and assigned to the 8th Armored Division. The 80th was reactivated on 1 Apr 42; also on this date the regiment was relieved from assignment to the 4th Armored Division and assigned to the 8th Armored Division. The regiment was finally relieved from assignment to the 8th Armored Division and broken up on 20 Sep 43.

In addition to the units discussed here, there were a number of armored regiments which were constituted (i.e. placed on the rolls of the Army) but never activated. Apparently, 10 regiments fit into this category. The 38th and 39th Armored Regiments were constituted as components of the 9th Armored Division on or about 5 May 1942 and were deleted on or about 7 July 1942. The 7th, 8th, 10th, 12th, 18th, 19th, 21st, and 22nd Armored Regiments were all constituted on the inactive list on or about 18 January 1943 and had their status revoked on or about 19 October 1943.

Footnotes

[1]It should be noted that equipment shortages, especially in medium tanks, made it very difficult for armored divisions to begin to approach, in reality, their theoretical equipment/organizational structure during the early period of the war.

[2]31st, 34th, 81st Armored Regiments not activated until 1 October 1941.

[3]Some divisions did not adopt the combat command organization until several months later.

[4]These four armored regiments were all new units, constituted separately from their parent cavalry regiments. However, after the the descendants of these four armored regiments were historically consolidated with the active units of their respective cavalry regiments. It should be noted that there is no historical connection between the 2nd and 3rd Armored Regiments noted here and the earlier 2nd and 3rd Armored Regiments.

[5]While the number of tank battalions in the armored division was halves, tank strength was not. Prior to the reorganization, each battalion had three tank companies, giving the division a total of 18 tank companies. Under the new organization each battalion had three medium and one light companies, giving the division a total of 12 tank companies.

[6]The 67th Armored Regiment was awarded an arrowhead with its CPC for Sicily, signifying its participation in the amphibious assault.

[7]Both the 66th and 67th Armored Regiments contributed units to the 6th Tank Battalion. The 6th, 66th, and 67th Tank Battalions all remained assigned to the 2nd Armored Division.

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An M1 Unit Uses Back-to-Basics Gunnery

by Lieutenant Colonel Jerry D. Malcolm
assisted by Staff Sergeant James Dale, Master Gunner

What does it take to have a successful gunnery program? Early planning, thorough preparation, innovation, good maintenance, hard work, team effort? Certainly, the answer is all of these if you want to attain good results. But the 3d Battalion, 69th Armor ("Black Panthers") of the 3d Infantry Division found that the most important ingredient was to go back to the basics and do them "by the book."

Preparation for our M1 tank gunnery program began several months before the battalion departed for Grafenwohr; however, the major effort consisted of an intensive 45-day home station gunnery program. The battalion returned from maneuver training and a battalion ARTEP at the Hohenfels Training Area (HTA) in late June 1983. Once at Aschaffenburg, the battalion's gunnery program went into high gear and included every weekend before department for Grafenwohr in mid-August.

The program consisted of three home station phases and the fourth and final phase, the live fire phase, at Grafenwohr. The objective of Phase I was to train the crew to include an accurate assessment of the tank PMCS with the emphasis placed on the turret. It also included corrections of faults and tank crew gunnery skills test (TCGST) training and administration in the local training area (LTA). Phase II, the conduct of a tank crew proficiency course (TCPC), was designed to mold those individual skills together so that each tank crew performed as a well-trained fighting team. Another objective of Phase II was to train platoons so they could effectively execute platoon-level offensive and defensive battle runs in which they simultaneously engaged multiple targets. Phase III, an extremely important phase, was to have battalion master gunners and turret mechanics conduct armament accuracy checks (the old turret verification) on each tank.

The final phase consisted of individual crew qualifications on Table VIII (TT VIII), a platoon defensive battle run, and a platoon offensive Table IX (TT IX) qualification. This was the payoff for months of planning and preparation and 45 days and nights of hard work at Aschaffenburg.

Planning our tank gunnery program began by assessing where we were and determining which objectives we hoped to achieve. This was a collective effort and involved reviewing past performance and gathering input from all company commanders and master gunners as well as the battalion staff.

Our tank gunnery objectives at Grafenwohr were to qualify 58 tank crews on TT VIII, to qualify all 12 tank platoons on an offensive TT IX

and to integrate live-fire with maneuver in conducting tank platoon ARTEPs. The battalion had completed *M1* transition firing in March and although many crew members were no longer in the same positions due to promotions and normal personnel turbulence, the majority of the people who had fired in February and March were still in the battalion. The battalion was one of the first units to successfully fire the gunnery standards outlined in FM 17-12-1, using fighting positions, and was confident with the transition gunnery results. Therefore, considering the limited ammunition and training time, it was decided to fire for qualification only a TT VIII and an offensive TT IX at Grafenwohr (TT IX defensive would be fired from ammunition saved from qualification tables).

Early in June, all companies were directed to stabilize their tank crews and submit accurate rosters of crew members who would fire in August. The goal was to keep the number of last-minute personnel changes to a bare minimum. For the most part, this worked very well since all personnel who went through the transition training had already been stabilized within the battalion to 31 July.

Each company conducted its own TCGST training in garrison and in the LTA and was then tested on the TCGST by a composite battalion team headed by the battalion master gunners. Each company was given one day in which to conduct the TCGST and two make-up days were scheduled for all personnel tested within their respective units. All crew members were required to take the TCGST and successfully pass it before continuing their training. The TCGST training and testing went well and was completed by the second week in July which included several non-*M1*-trained crew membrs.

Tanks were carefully checked for accurate PMCS and all faults noted were corrected. Master gunners verified the PMCS by checking a random selection of tanks in each platoon. As might be expected, the number of completely operational tanks in the platoon decreased slightly, as crew members did not want to take a chance on their tanks not working properly, therefore they were very critical in their PMCS.

With Phase I complete, the crew and platoon training (Phase II) began in earnest. TCPC was set up in the LTA. The course was about a half-mile in length and used two slightly-elevated fighting positions similar to those on Range 4 at Grafenwohr. In all, the course included nine engagements using the main gun, coax and .50 caliber machinegun during simulated day and night firing. Although Army Tank Target System (ATTS) targets were not used, numerous targets at varying ranges permitted good crew duties' practice on a number of target scenarios. Thermal blankets powered by a 3 kw generator were effectively used for night targets. Each company was responsible for training its own crews. Crews made several practice runs both day and night in a 24-hour period and then were evaluated by a battalion master gunner who rode onboard the tanks and was hooked into the crew's intercom set, permitting on-the-spot and end-of-run critiques.

The day and night platoon course was run under the active supervision of the company commanders who controlled their movements and evaluated their performances. Thermal blankets were again used for night targets and platoon leaders were required to include calls for indirect fires just as they would have to do during actual firing on Range 10 at Grafenwohr.

In order to maximize training time and terrain, both crew and platoon drills were conducted at the same time. Weak and less-experienced crews and platoons were given additional opportunities to run the TT VIII & IX course. Scores for TT VIII TCPC were computed on each crew and a master scoreboard was maintained for the battalion. This proved to be a good incentive for crews to do better and improve their scores.

Phase III, the Armament Accuracy Checks (AAC), began immediately after the completion of the crew and platoon training and, in some cases, even before. The goal was to identify any problem areas early on, and allow enough time to correct these faults prior to deployment to Grafenwohr. A

Task	Go	No Go
1. Weapons		
a. Gunner's M240	—	—
b. Loader's M240	—	—
c. M2 .50 Cal	—	—
2. G.P.F.U.		
a. TC	—	—
b. Gnr	—	—
c. Ldr	—	—
d. Dvr	—	—
Faults Noted		
3. Recoil Exercise	—	—
Faults Noted		
4. Borescope and Pullover	—	—
Faults Noted		
5. Crew PMCS	—	—
Faults Noted		
6. Breechblock Services	—	—
Faults Noted		
7. Sights/Fire Control Purging	—	—
Faults Noted		
8. Pre/Post Fire Checks	—	—
Faults Noted		
9. AAC, FM 17-12-1, App C		
a. Main Accumulator	—	—
b. Power Elev and Elev Cyl.	—	—
c. Fault Indicator	—	—
d. Ballistic Solution*		
e. Special Input Data	—	—
f. Muzzle Reference System	—	—
Faults Noted		
10. Special Gunnery Checks, TM -10-3	—	—
a. Lead Accuracy Checks	—	—
b. Superelevation Check	—	—
c. Cant Unit Test	—	—
Faults Noted		
11. Grenade Launchers	—	—
Faults Noted		
12. Overall Rating	—	—

*Ammo SUBDES 0 and 1 for Heat, test 5-8, does not work with provided solution board in the FM, however it will not affect the accuracy of the weapon system.

Figure 1. Armament Accuracy Checklist

battalion team of turret mechanics and master gunners conducted detailed AACs concentrating on, but not limited to, the checks outlined in figure 1.

Again, as when the stringent, thoroughly supervised PMCSs were conducted, the number of non-operational systems slightly increased in the battalion as no chances were taken on possibly faulty equipment. This was later to play an important role in the success of the battalion on both TT VIII and IX at Grafenwohr. Correction of faults continued right up to the day of deployment to Grafenwohr. When the battalion rail-loaded, 57 of the battalion's 58 tanks were operational and made the trip.

The final phase began as the lead company pulled off the train at Grafenwohr. The pace at Grafenwohr was just as demanding as had been the previous 45-day schedule at Aschaffenburg. Upon arrival, a company immediately moved to a range (4, 10, 99) or a maneuver area and downloaded its basic load of main gun ammunition. After downloading, the lead company began a half day of TCPC before moving to Range 4 to calibrate and begin firing TT VIII.

The initial step was for each tank to boresight following the step-by-step procedures outlined in figure 2. This boresight was conducted each day the tank was fired. Updated barometeric pressure and temperature information was indexed into the computers before firing and later on if there were significant temperature or pressure changes. After boresighting, each tank was carefully calibrated with HEAT-TP-T using the step-by-step procedures outlined in figure 3. This produced excellent results. 49 tanks were calibrated on the first attempt, and the remaining eight on the second attempt. Crew error was the main reason for noncalibration on the first attempt.

The results of the initial firing company on TT VIII were very gratifying with 81 percent total first round hits and 86 percent SABOT first round hits. These percentages increased to 89 percent overall and 93 percent SABOT first round hits with a later company.

1. Set up tank for boresight per operator's manual. Insure fire control is in EMERGENCY mode.
2. Insert Pye-Watson device into muzzle with locating block in the 12 o'clock position.
3. Lay Pye-Watson aiming dot on the top left corner of the boresight target (known range) (manual control) (G pattern).
4. Using elevation and azimuth knobs, place the gunner's auxiliary sight boresight cross on the top left corner of the boresight target.
5. With boresight key depressed, toggle gunner's primary sight to the top left corner of the boresight target.
6. TC verifies that Pye-Watson aiming dot, GAS boresight cross and GPS aiming dot are still on the aiming point.
7. Record reading from computer control panel screen.
8. Remove Pye-Watson device and rotate 180 degrees, reinsert with locating block in the 6 o'clock position. (Do not rotate the device while in the tube as it will damage the locating block.)
9. Lay Pye-Watson device aiming dot on the top left-corner of the boresight target.
10. With the boresight key depressed, toggle gunner's primary sight aiming dot to the top left corner of the boresight target.
11. Record reading from computer control panel screen.
12. If elevation reading in step 5 differs more than one mil from elevation reading in step 20, obtain another Pye-Watson device and start again with step 2.
13. If deflection reading in step 5 differs more than .5 mils from deflection reading in step 10, obtain another Pye-Watson device and start again with step 2.
14. If steps 12 and/or 13 are not used, figure the mean deflection and elevation using the recording in step 6 and 10.
15. With the boresight key depressed, toggle the mean elevation and deflection readings into the computer control panel screen.
16. Record and enter this information into the computer as GPS boresight data.
17. Lay the GPS aiming dot on the top left corner of the boresight panel using manual controls.
18. Refer the GAS to the top left corner of the boresight panel.
19. Remove the Pye-Watson device from the muzzle.
20. Initialize the Muzzle Reference Sensor (MRS boresight).
21. Align the TIS to the boresight aiming point.

Figure 2. M1 Boresighting.

TT VIII was conducted by a battalion team headed by two battalion master gunners. Each company was responsible for the OIC and Safety Officer plus the administrative requirements on the range. As in every tank gunnery during August, range fires, scheduled Air Force flyovers, mechanical problems and weather factors caused some delays, but all 58 tank crews were able to fire a qualification day and night course in eight days. When the last tank had completed its night run, the battalion had qualified 55 of 58 crews on the first run with 19 of those crews firing distinguished. The three crews that failed to qualify on their first run (one missed qualifying by three points as they received 1,425 points out of the 1,428 necessary to qualify) were fired a second time and qualified as a re-fire.

Records of all main gun rounds fired for calibration and TT VIII were charted. The results showed 8.6 percent of the 1,620 rounds fired were over and 7.4 percent were short. The primary reasons for the misses were determined to be improper lasing, failure by the gunner to change the ammunition select switch from HEAT to SABOT and vice versa. In some isolated cases gunners used a fully operational fire control system in BOT mode (first round short, re-lay center of mass, lase, re-lay to compensate for short round). Of course, this is not the proper method to be used on the M1 tank and as a result some misses occurred.

Few tanks went down for mechanical or fire control problems throughout the qualification phase. This was largely due to the thorough PMCS, detailed home station AACs, and the prompt correction of faults noted. Tanks that did develop problems were quickly returned to operational status by unit and support maintenance personnel.

Following TT VIII qualification, each company went through dry-fire platoon defense and offensive exercises. These dry-fire exercises were conducted on Range 99 and permitted platoons to practice fire commands, lasing, and movement into and out of firing positions.

Each platoon fired a live-fire defensive exercise enabling them to work on fire distribution. Platoons that hit well during daylight firing and conserved ammunition were permitted to

fire a night defensive live-fire exercise.

The 30-hour ARTEP began with a pre-combat inspection (PCI) then included day and night maneuvering against an augmented scout platoon OPFOR. The maneuver phase was followed by an offensive day live-fire TT IX on Range 10, then movement back to a field location for more maneuver training. The final exercise was a night live fire, Table IX. A good after-action review with platoon input was conducted after the maneuver phase and both live-fire phases of the ARTEP.

The results of TT IX were scored by a division gunnery team, and again the Panthers produced excellent results with all 12 platoons qualifying, of which eight were rated as distinguished. Fire distribution, target identification, timely sensings/observations and target hand-off were excellent. Two platoons hit all main gun targets and had nearly 100 percent coverage on the machinegun targets, thus preserving 20-30 percent of the ammunition per platoon.

As was the case with TT VIII, *each tank was boresighted every day* to insure greater accuracy. Additionally, tank commanders updated the Muzzle Reference System (MRS) at their discretion. There continued to be few maintenance problems and those that occurred were quickly repaired. An operational fire control system during tank gunnery is the foremost concern of tankers, and is a morale factor for commanders to consider when predicting gunnery results prior to crews actually firing the course. At one point the overall battalion operational readiness (OR) rate, including vehicles left at home station, stood at 97 percent. The high OR rate of the tanks and the battalion's successful gunnery period were in large part due to detailed, accurate PMCS and AACs and our insistence on *by-the-numbers boresight and calibration!*

As the *M1s* of the "Panther Battalion" hit the wash racks and the crews conducted their post operations PMCS, in preparation for the rail trip back to Aschaffenburg, the Panthers were tired and ready for a less hectic schedule, but they also knew they had successfully accomplished their objectives.

1. Set ammo select switch to appropriate ammo (SABOT, HEAT, HEP).
2. Set fire control mode switch to EMERGENCY.
3. Press and release AMMO SUBDES. Insure that number in display matches ammo type. Codes are on inside of computer control panel.
4. If correct number is in display, go to step E. If not:
   a. Press and release appropriate number key. Number will appear in display.
   b. Press and release ENTER key.
   c. Press and release AMMO SUBDES key. Check that display reads the same as the number just entered.
5. Press and release ENTER key.
6. Close protective cover and tighten two screws.
7. Press and release ZERO key. Display must read 0.0.0.0.
8. If correct reading is in display, go to step I. If not, do the following:
   a. Adjust display reading by moving reticle adjustment toggle switch to U, D. L, or R, as needed.
   b. Press and release ENTER key.
   c. Press and release ZERO key, check to see that display reads the same as the numbers entered. If not, notify organizational maintenance.
9. Press and release ENTER key.
10. Set fire control mode switch to NORMAL.
11. Have loader load main gun with type of round to be fired.
12. Acquire target at 950 meters.
13. Look into gunner's primary sight eyepiece and lay reticle on center of target.
14. Lase to target, relay to center of target.
15. Make sure ready to fire symbol and range appear below reticle. If the "F" fire control malfunction appears, begin troubleshooting. (Refer to table 3-1, TM 9-2359-255-10).
16. Fire one SABOT round.
17. Acquire target at 1,500 meters. Have loader load SABOT round into gun.
18. Lase to target, relay to center of target.
19. Fire one SABOT round.
20. If gunner hits the first two targets, screening test is valid. Tank is qualified. If gunner misses either of the first two targets, continue to step U.
21. If the gunner misses either of the first two targets, he will acquire the 1,200 meters target. Loader reloads the main gun with another SABOT round.
22. Gunner lases to target, relays to center of target.
23. Gunner fires one SABOT round.
24. If gunner misses two of the three rounds fired, the tank is not considered qualified and the tank's fire control system will be re-checked.
25. If gunner hits two of the three targets, screening test is valid and the tank is qualified.

Figure 3. Live-Fire Screening Test

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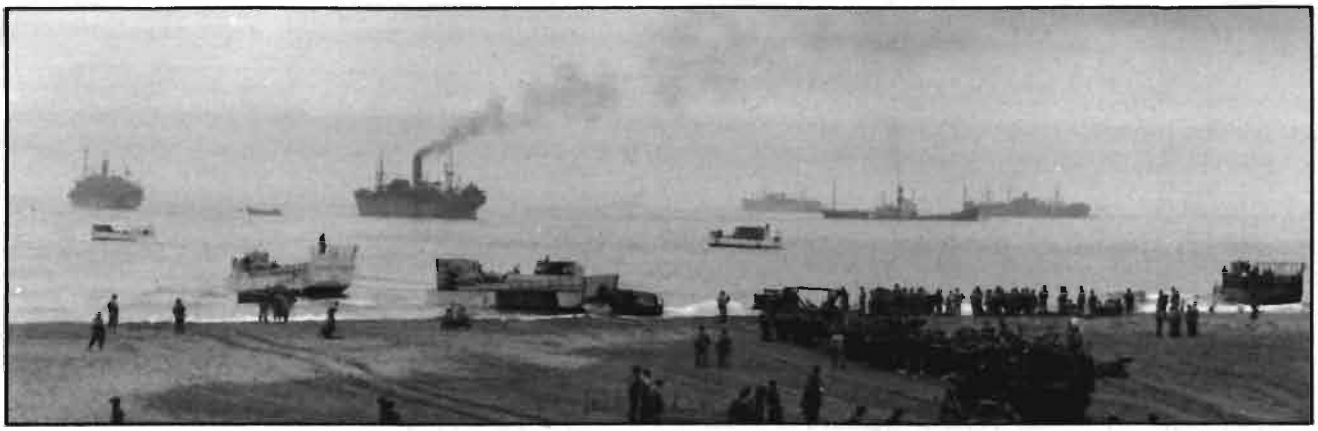


Armor in the RDF: Oran, 1942

by Captain William R. Betson

The ability to deploy strong ground combat forces rapidly to remote locations is essential to a nation with interests as varied as those of the U.S. But our doctrine requires the successful integration of all combat arms. What then, should the role of armor be in these operations?

Our strategic mobility forces (air and sea-lift) can transport only limited amounts of heavy vehicles and equipment to distant places in a limited time span. Should the small numbers of tanks be spread out to support the larger number of infantry formations? Or should they be massed and used as a counterattack or *coup de main* force? How should these tanks be used? Should one exploit their firepower to attrite enemy formations; or use their mobility to pierce enemy lines and strike at the cohesion of the opposing army?[1]

In attempting to come up with some answers, we must keep in mind that in future force projection missions, we will have to do it right the first time—there will be no second chance.

Some answers to these present questions are found by looking at the past, specifically at the Allied invasion of northwest Africa in November 1942, when the U.S. 1st Infantry Division—reinforced by Combat Command B (CCB) of the 1st Armored Division—deployed from Great Britain to Algeria, seizing the port of Oran and surrounding airfields.

There are many parallels to the present mission of the Rapid Deployment Force (RDF). The division (+) was transported across thousands of miles of ocean into an uncertain political situation. The immediate objective was to seize a beachhead and link up with an airborne battalion dropped on an inland airfield. The expedition was mounted on short notice, and with inadequate equipment. Further, the U.S. units involved were fighting their first action.

Background

The Oran landings were part of Operation *Torch,* the 1942 Anglo-American invasion of North Africa. Oran was selected because it is a major Mediterrean port and its nearby airfields were vital.[2]

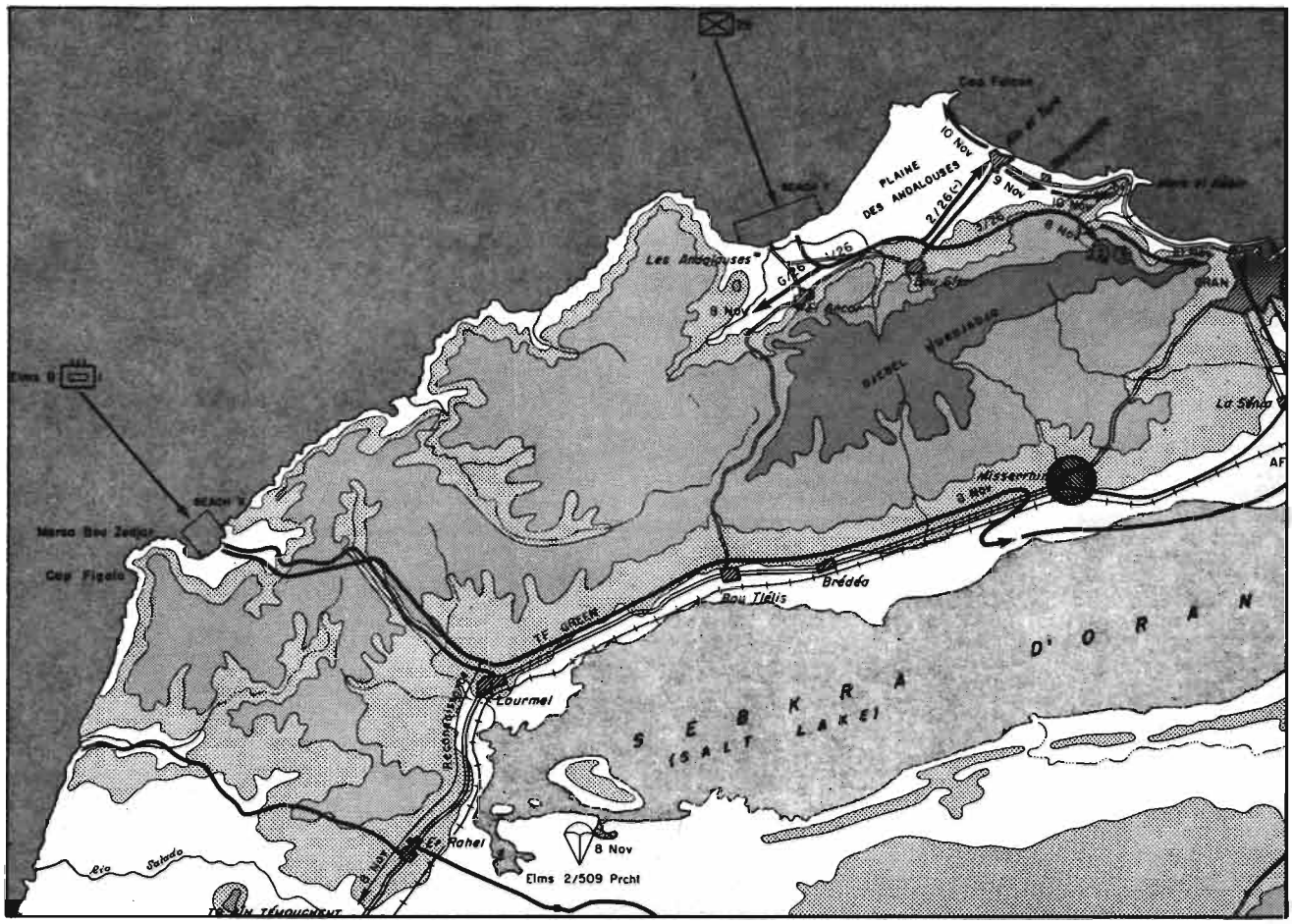
Algeria, then a colony of defeated France, was administered and defended by the Nazi-imposed Vichy French regime. The Germans permitted the Vichy government to maintain an army in North Africa for the external defense and internal security of their colonies there. Appreciating Oran's qualities as a potential air and logistical base, the French Army stationed some 16,000 men in the port and its environs and organized them into the Oran Division of eleven infantry, seven cavalry, and five artillery battalions. The division was at about 80-85 percent strength, but Axis restrictions on vehicles and spare parts kept it relatively immobile and denied it modern armored fighting vehicles. Although the Allies considered the division's colonial infantry as second rate, they believed that the French cadre of professional officers made the division more or less battleworthy. Further, the Allies counted the division's two Foreign Legion battalions among the best troops in the world.

French resolve was also in question. No one knew if the French would actually resist the landings and fight their old American allies but if they did, the Oran Division was not to be considered an insignificant force.[3]

Several French warships and 45 fortified coastal defense guns raised even greater concern about an Oran landing. There were also six more guns at nearby Arzew, a potential landing site (see map 2). In addition to ground troops and warships, there were about 100 French warplanes, including modern fighters, at the airfields of La Senia and Tafaraoui. This air force was estimated to be capable of wresting local air superiority from the British carrier based naval aircraft that would support the operation.[4] Should the Allied force fail to quickly neutralize the French aviation, the establishment of an amphibious force ashore would prove impossible.

In addition to the threat posed by the enemy air, land and sea forces, allied shipping assets were questionable. Until almost the last minute, no one knew how many ships would be available, and at that time, there were no specialized tank landing ships (LSTs) available to put armored forces ashore. The British did provide three makeshift landing ships—converted from the shallow draft oil tankers used on Venezuela's Lake Maracaibo—but because of height restrictions, these could carry only light tanks and halftracks; American medium tanks were too tall. Until a port was seized, armored support for the operation would be limited to the 60 *M3* light tanks and 60 halftracks which could be crammed aboard these converted ships.[5]

- An amphibious landing had to be carried out at some distance from the port against a well-defended area.
- Unless the landing force seized the local airfields quickly the French could gain air superiority and doom the operation.



Map 1. The bold attack on the western approaches to Oran involved coordinating two amphibious landings, parachute drops on landing fields south and west of the city and an ill-fated direct assault on the harbor.

•Unless the operation succeeded quickly, the French would have time to demolish the port and render the entire operation pointless.

•Finally, the swift movement from the relatively distant beaches to the port and airfields would be difficult since only enough armored vehicles to equip one light tank and one mechanized infantry battalion could be quickly put ashore.

The Allies were unsure whether the Vichy French would fight.[6] But the planners of the operation had to assume resistance would be fierce. Facing a risky undertaking, their bold use of the available armor bears our close analysis.

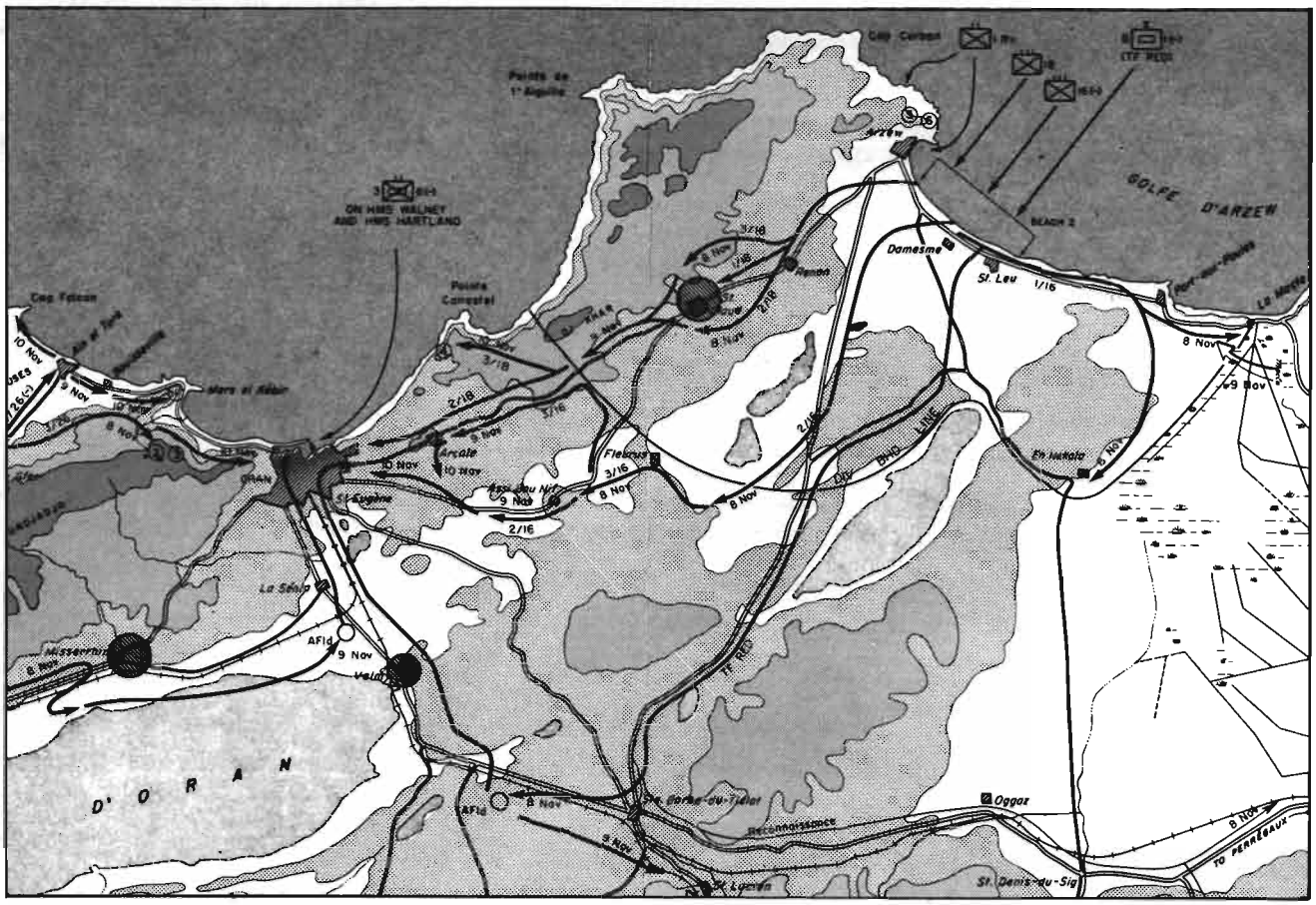
The Plan

The Allied plan was conceived at Headquarters, Center Task Force (CTF), commanded by Lieutenant General Lloyd R. Fredendall. The force was comprised of the 1st U.S. Infantry Division, CCB of the U.S. 1st Armored Division, an airborne battalion, elements of the U.S. 1st Engineer Special Brigade, and assorted support troops. [7] Fredendall's staff consisted basically of the staff of the U.S. II Corps, which he also commanded.

The concept of operations was imaginative and daring. The operation would begin with a parachute assault on the main French airfield at Tafaraoui, followed by amphibious landings at three separate points on the coast. Small armored units put ashore from the makeshift LSTs would attempt to link up with the airborne force. Then all forces would converge on the port. While this was underway, an infantry battalion on board two ex-U.S. Coast Guard cutters would attempt to sail into the port, rush the docks and seize them by force. Additionally, as soon as the airfields were seized, word would be flashed to Gibraltar where the Spitfires of the 31st U.S. Fighter Group would be waiting to fly to Oran. If all went according to plan, fighters would be flown to the seized airfield and be operational by D-Day afternoon. Air superiority, a major prerequisite for success, would be assured.

Speed was essential, for the objective was to overwhelm the French before they could make up their minds to resist. No overwhelming predominance of force was being employed—the number of maneuver battalions in CTF was about equal to the number in the Oran Division—and the latter could be heavily reinforced within a few days by other French units in North Africa. The plan depended on lightning maneuver to paralyze the enemy. Since speed was such a prerequisite for success, the armored forces had an importance much beyond their numbers.

The armored combat command was divided into two task forces which would land on either flank of the assault. The first, Task Force Red, under the command of Brigadier General Lunsford E. Oliver, would land some 20 miles east of Oran at Beach "Z," near Arzew. Under the "Z Force" plan, two regimental combat teams of the 1st Infantry Division (16 and 18) would land and secure a foothold southeast of Arzew, while the 1st Ranger Battalion would take out a pair of coastal defense batteries north of the town. As soon as possible after



Map 1. The multi-pronged attack on Oran from the east grew out of an amphibious landing at Arzew, preceded by a Ranger assault on coastal guns north of the city. Only light tanks could be landed until Arzew port was secured.

the landing, TF Red would pass a flying column through the secured beachhead to race the 25 miles to the Tafaraoui airfield via Ste. Barbe-du-Tielot. The makeup of the flying column was determined by the number of vehicles that could be jammed into the two converted landing ships.

The other half of CCB, 1st Armored Division—Task Force Green under Colonel Paul Robinett—would accomplish the right flank landing of the operation at "X" Beach, some 30 miles west of Oran near Mersa Bou Zedjar. TF Green's plan was similar to that at "Z" Beach. Two dismounted companies of the 6th Armored Infantry Regiment would seize a beachhead through which a flying column would pass. The only difference was that this column would move inland to Lourmel (see map 1) where it would receive orders from CCB to either move north of a salt marsh southwest of Oran to seize La Senia airfield, or go south of the marsh to help with the capture of Tafaraoui. As with TF Red, the size of the flying column was determined by the number of vehicles which could fit into the single landing craft allotted "X" Force.

The main bodies of the two task forces would move along the routes cleared by the flying columns as soon as the former could get ashore and organized. This would take time as the armored vehicles not delivered to the shore would have to be transloaded from a cargo ship to a landing craft and landed one or two at a time. In the case of the *M3* medium tanks of the 2d Battalion, 13th Armored Regiment, the docks at Arzew were required. The success of the operation, then, depended on the skill and *elan* of the flying columns. In the final analysis, the success of the Oran landings and of Operation Torch depended on three light tank companies.

The Landings

Two disasters quickly jeopardized the operation and made its success even more dependent on the 1st Armored's tankers. The airborne operation, under Lieutenant Colonel Edson Raff, never really got started because the transport planes carrying the unit from Britain got lost.[8] Although most of the inexperienced pilots managed to get their paratroopers to the vicinity of Oran, the 2d Bn-509th Parachute Infantry never got to the airfield until after the operation. Even then, Raff could assemble only 300 of his 556 troops.

The other disaster resulted from the attempted *coup de main* on the docks at Oran. The plan, Operation *Reservist,* called for the 1st Armored Division's 3d Battalion, 6th Armored Infantry, to sail straight into Oran harbor aboard British-manned ex-U.S. Coast Guard cutters, dock at the wharves and seize the port facilities. CTF opposed this seemingly reckless idea, but the British pressed for its approval. The cutters approached the harbor with large American flags flying and loudspeakers announcing both the American nature of the operation and its friendly intentions, but once the two small warships broke into the harbor, they were promptly blown out of the water by French gunners firing at point blank range. Operation *Reservist* remains one of the war's most complete disasters. Only 47 uninjured soldiers got ashore and were immediately captured.

If the armored columns met similar fates, the operation would fail.

Task Force Red

The main landings took place uneventfully just east of Arzew at 0100 hours. The 34 transports of "Z" Force began to put ashore two thirds of the 1st Infantry Division, the 1st Ranger Battalion, and the armored Task Force Red. The Rangers quickly seized the Arzew coastal batteries and the infantry secured the beaches against minimal opposition. But disembarking the tanks posed problems and took longer than planned. This delayed the operation, but by about 0820, the reconnaissance force under Captain Samuel Yeiter, moved out from the beach, followed 15 minutes later by the rest of the flying column commanded by Lieutenant Colonel John K. Waters. Waters' flying column moved toward Tafaraoui airfield, covering the 25 miles to the field without opposition. At Tafaraoui, fire from French dual-purpose antiaircraft guns halted Waters' advance. Waters directed his attached tank destroyer platoon to engage the French guns while he detached two infantry platoons to go beyond the airfield and cut the road to Oran, blocking the approach of reinforcements. Simultaneously, A Company, 1st Armored Regiment, attacked the airfield from the south while B Company and 1st Platoon, E Company, 6th Infantry, struck from the east. Shocked by finding their inland airfield under attack by American armor, the French surrendered, quickly yielding some 300 prisoners.

At 1215 hours, word reached Gibraltar that Tafaraoui airfield was captured and by 1630 the Spitfires of the 308th and 309th Fighter Squadrons, 31st Fighter Group, USAAF, arrived. In one bold stroke, French airpower in northwestern Algeria had been dealt a crippling blow, American air superiority was assured and the major communications route from Oran to the interior had been cut.

Task Force Green

CCB's other element, TF Green, had a more difficult time. Although the initial echelons met no resistance, the transport landing Lieutenant Colonel John H. Todd's flying column grounded 360 feet offshore. It took until 0815 to ferry the column's 27 halftracks, 16 jeeps and 20 light tanks to the beach.

Once ashore, Todd's reconnaissance force departed for Lourmel where it clashed briefly with a French armored car of the 2d *Chasseurs d'Afrique.* Soon, the rest of the force was rolling and by 1135 was in Lourmel. Todd had been in Lourmel for about 30 minutes when the TF commander directed him to take the northern route to the La Senia airfield because TF Red needed no help at Tafaraoui. Leaving one tank platoon to outpost Lourmel, he set off with a much depleted force of 15 tanks and several halftracks.

Communications problems then began to plague TF Green. Units moving to Lourmel lost contact with the beach because of the intervening high ground. The flying column lost contact with the task force and Robinett had no idea of his subordinate's position or situation until the next day when the main body of TF Green closed on La Senia. As Todd maneuvered to overcome resistance from French armored cars at Bou Tlelis, he lost contact with his assault gun section and a tank platoon. These losses, plus two tanks damaged by enemy fire, further reduced Todd's force to seven light tanks and a few halftracks—out of the force of 47 armored vehicles that had left "X" Beach. Deep in the rear of a 16,000-man enemy division, he pushed on with his puny force and destroyed a 75-mm gun position at Bredea Station. After meeting more resistance near Misserrhin, he halted for the night.

Robinett followed Todd, collecting his stragglers. HQ picked up Todd's detached platoon at Lourmel and collected Todd's other elements near Bou Tlelis. With most of the flying column now under his direct command, Robinett spent the night between Bou Tlelis and Bredea Station. Thus, at the end of D-Day, TF Green lay scattered between Mersa Bou Zedjar on the coast at "X" Beach, and Misserrhin, its precarious position aggravated by communications difficulties. Had the French counterattacked, they could have defeated Robinett's command in detail.

But despite all these problems, plus the failures of the airborne landings and the harbor assault, CTF had securely established all three beachheads and captured the critical airfield at Tafaraoui. Some 14,000 troops were ashore and progressing toward their objectives. At "Y" Beach, the 26th Regimental Combat Team had made good progress and was in contact with the French *2d Zouaves* Regiment on the Djebel (Mountain) Murjadjo. The 18th and 16th RCTs had pushed well inland, meeting serious resistance only at St. Cloud where the 1st Battalion of the 1st Foreign Legion Regiment and the 16th Tunisian *Tirailleurs* were well entrenched. At sea, the Allied naval escort had easily repulsed several forays by French naval units and destroyed or neutralized the coastal artillery

positions.

On the other hand, the operation was not yet out of the woods. Units of CCB were deep within enemy territory, and difficult or impossible to support should they get in trouble. The French had resisted much more firmly than expected; the *Zouaves* on the Djebel and, especially, the Legionnaires at St. Cloud, had fought spiritedly and skillfully. In fact, CTF at first decided that St. Cloud, astride the main supply route from "Z" Beach to Oran, would have to be taken before the final assault on Oran could begin.

The French Counterattacks

The French high command realized, of course, that its relatively numerous dispersed forces could be defeated in detail. So, they concentrated their available mobile formations into two light mechanized brigades for use as rapid reaction forces. But their obsolescent *Renault R-35s* were no match for even the *M3* light tanks.[11]

The French command had positioned one of these brigades south of Oran, near Sidi-bel-Abbes (home of the Foreign Legion) and, upon hearing of the American landings, they ordered this force to attack northward, recapture Tafaraoui, and breakthrough to Oran.

In contrast to the French command's sluggish reactions, the Americans now demonstrated their flexibility. Expecting an attack from Sidi-bel-Abbes, they used air patrols to reconnoiter the roads north of that town. The French move was observed and the American command reacted quickly. CTF sent dive bombers to attack the column and rushed a platoon each of light tanks and tank destroyers, plus the only two debarked medium tanks of the 2/13 Armor, forward from the docks at Arzew. In addition, Fredendall held most of TF Red at the Tafaraoui airfield instead of moving it north to attack Valmy. This last move was decisive.

The Americans were ready when the French brigade made contact with the reconnaissance platoon of the 1st Battalion, 1st Armored Regiment on the afternoon of 9 November 1942, near Ste. Barbe-du-Tielot. This would be the U.S. Army's first North African tank-vs-tank action and it ended quickly with victory for the Americans.

While Lieutenant Robert Whitsit's platoon of the 701st Tank Destroyer Battalion laid down a fire base, Captain William Tuck's B Company, 1st Armored Regiment, attacked the French in an inverted wedge formation. The old, slow *Renaults* were no match for the U.S. tanks and the

qualitative difference was decisive. Tuck's tankers knocked out 14 French tanks in rapid succession. The commander of the 1/1 Armor described the action as more of a tragic massacre than a battle.[12] The French light mechanized brigade retreated and did not again threaten the landings. The Americans lost one tank, one halftrack, and one man.

Another French effort caused the American commanders more worry. Near La Macta, on the far eastern flank of the U.S. landings, elements of the 2d Algerian *Tirailleurs* infiltrated the positions of the 1st Battalion, 16th U.S. Infantry, and temporarily cut off the Americans. However, by the time relief armored units reached the area, the 16th Infantry had restored the situation.

The failure of the counterattacks meant that the French could not reinforce Oran before the Americans could conduct a coordinated attack. The city's defense would lay in the hands of its approximately five infantry battalions and one cavalry regiment, a force decidedly inferior to the 13+ better-equipped U.S. battalions now ashore. But all was not yet lost for the French. Their force had not yet suffered severe casualties, and they could concentrate their still-fresh infantry battalions in an arc of relatively strong positions south of the cities of St. Cloud Arcole, Valmy, La Senia, Misserrhin and the Djebal Murdjadjo.

Task Force Green—Second Day

As daylight broke on the 9th, Todd's greatly depleted flying column on the other side of Oran resumed its march toward the La Senia airfield. Bypassing Misserrhin, Todd thrust his small force between the French positions at Valmy and LaSenia, surprising and overrunning the airfield, capturing a few planes, some 75-mm artillery pieces, and a considerable number of prisoners. He then deployed his puny force, now surrounded on three sides by superior French forces, and on the fourth by an impossible marsh. Although the French directed artillery fire onto the airfield, for some reason they never attacked this weak and exposed force. Todd hung on and was joined that afternoon by a tank company and mechanized platoon which Oliver had detached from TF Red and sent to the airfield. This reinforcement enabled Todd to conduct a spoiling attack that silenced the most troublesome French artillery battery.

Meanwhile, Robinett, with elements of both the flying column and the main body, moved out at dawn from his position near Bredea. His force made rapid progress until it reached the French outpost at Misserrhin where he took artillery fire. Replying with his self-propelled guns of the 27th Artillery, Robinett ordered an attack on the town. But having no infantry (it was left back at Er Rahel), he could either wait until infantry could be brought up from Mersa Bou Zedjar, or take his command around Misserrhin through the only route left to him, the supposedly impassable Sebkra marsh. Robinett still had no communications with Todd, but knew that the remnants of the flying column were weak and might be destroyed by a French counterattack.

Robinett decided to attempt to bypass by moving through the marsh. In the dying light, Robinett's force immediately set out. Slowly, and with many halts to recover mired vehicles, the force struggled through the lake bed. The mud seemed like wet cement, and Robinett began to despair of getting through. Finally, at about midnight, Robinett drove on ahead of his column in a jeep to attempt to make contact with Todd, who had traversed the marsh during daylight. Robinett found a guide that Todd had posted, and closed on Todd at about 0400—and none too soon. Todd's force was out of fuel and running out of ammunition. Robinett's arrival coupled with that of Lieutenant Colonel William Kern and half of the 1/6 Infantry at daybreak, assured the position at La Senia airfield.

While CCB was securing La Senia airfield and defeating the French counterattacks, the main elements of the 1st Infantry Division continued to close on Oran.

The 18th Infantry attempted a coordinated attack on St. Cloud, east of the city, on the 9th, but French troops, especially the Legionnaires, put up fierce resistance, and the attack bogged down by noon with considerable casualties. Wanting to keep moving toward Oran and desiring to avoid heavy civilian casualties, the commanding general of the 1st Infantry Division, Major General Terry Allen, ordered that St. Cloud be invested by one battalion and that the remainder of the regiment move toward Oran in preparation for the general assault on the city to be carried out the next morning.

As night fell on 9 November, CTF could again be satisfied. The 18th and 16th Infantry regiments were closing on Oran from the east. Both major airfields had been taken and the main French counterattacks defeated. Both CCB and 1st Infantry Division were in good positions to conduct a concentric attack on Oran the next day. Fredendall dispatched his G3, Colonel Claude B. Ferenbaugh, ashore to headquarters, 1st Infantry Division, to coordinate the move. Meeting with Allen and Oliver, Ferenbaugh directed that all units jump off at 0730 on the 10th. Speed was essential, as no one wanted to give the French another day to wreck the the harbor.

The Final Attack

None of the American units made their line of departure (LD) by 0730. Exhausted after two weeks confinement aboard ship and three days fighting with little sleep, the infantry could not reach their start lines on time. Once the 16th and 18th Regiments did get going, they met spirited resistance from the 2d *Zouaves* near Arcole and St. Eugene and were delayed.[13]

CCB planned to make its main attack with the elements of TF Green at La Senia airfield. Robinett, however, did not receive orders for the attack until a few hours before LD time, just as he was preparing to attack the enemy around Valmy. Robinett refused to make this new attack before he was ready and asked Oliver if he could delay his LD time and "be allowed to get it off just as quickly as possible."[14] The CG of CCB concurred, but stressed the need for speed.

Robinett concentrated the bulk of his force—two and one-half tank companies, one company of armored infantry, and a section of tank destroyers, under Lieutenant Colonel Todd and ordered him to bypass the enemy near LaSenia and drive straight for the port and for the French headquarters in town.

Todd jumped off in massed formation at about 0930 and traversed the open ground west of La Senia opposed only by sporadic artillery fire (which may have been misdirected British naval gunfire). While Todd moved west of town, TF Red detached Lieutenant Colonel Waters east of the village in a supporting attack along a parallel route.

Once Todd and Waters had bypassed La Senia, Robinett ordered his headquarters tank platoon to attack the town. French resistance suddenly collapsed when tanks penetrated their defensive belt. Over 1,000 Frenchmen surrendered to the tank platoon. This behavior was in stark contrast to that exhibited at St. Cloud where the French had fought against a standard infantry/artillery attack.

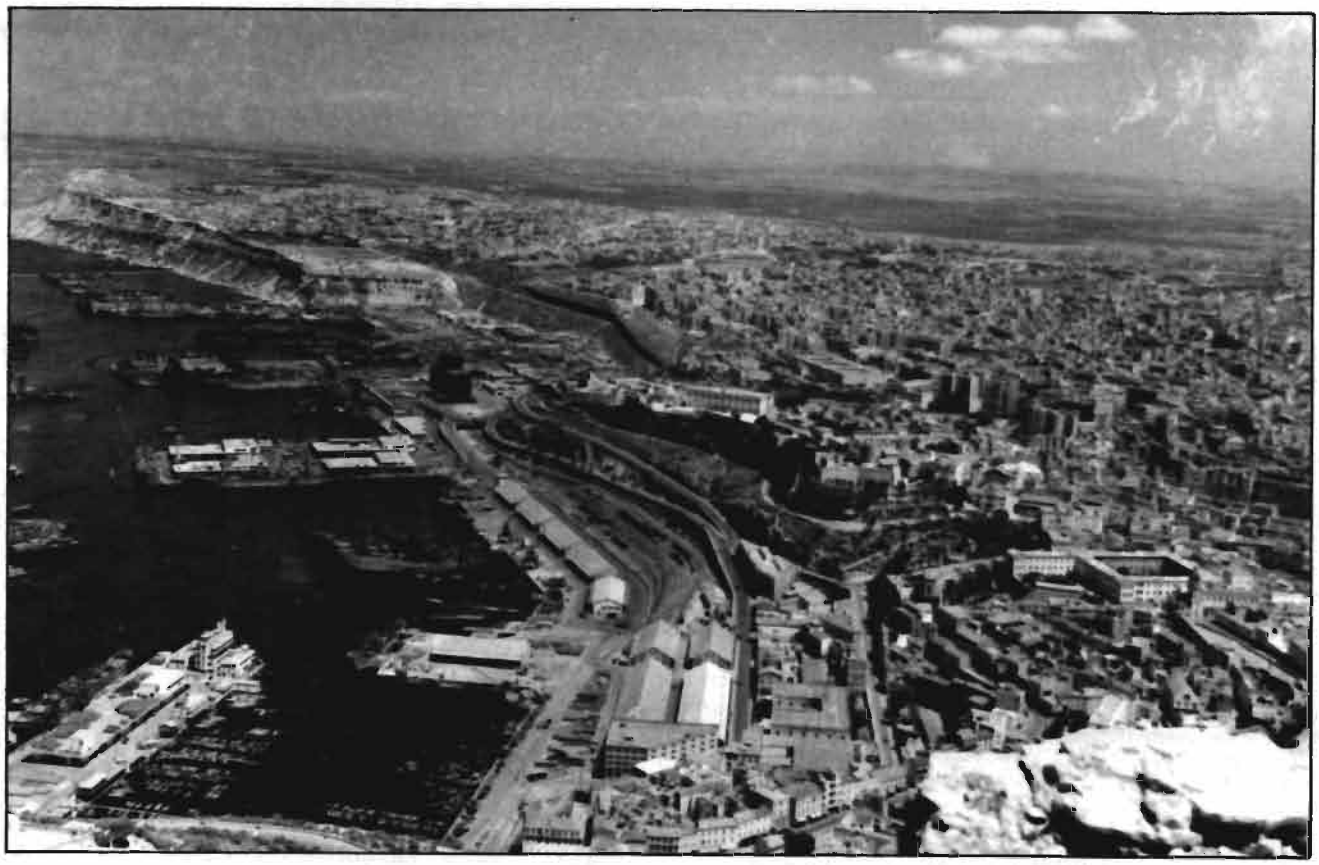
Todd and Waters now had little in front of them. Eliminating a roadblock on the outskirts of town, CCB encountered only scattered sniper fire, and small arms and vehicular machinegun fire effectively dealt with that. As Lieutenant Colonel observed, ".50 caliber machineguns are excellent against snipers. They will shoot right through a house."[15] By 1100, Todd's forces had reached the port and French military headquarters and captured the French commanding general. With this, the battle was over and the remaining French forces surrendered, although St. Cloud resisted one more attack. That afternoon, CCB moved to the vicinity of Tafaraoui to rest, reorganize, and prepare for further action against the Germans in Tunisia.

The Lessons

The American victory at Oran is not a well known feat of arms. Neither France nor the U.S. really wanted to publicize a battle fought between old allies. CTF suffered over 600 casualties, including 276 killed.[16] But these losses, considering the importance of the objective, were acceptable, and the Oran operation must be considered a significant victory.

The Allies had moved over 27,000 men a great distance on relatively short notice and had seized two important airfields and a port in minimal time against considerable resistance. All arms contributed to the victory. But the success has a significance beyond its importance as a step toward Allied victory in WW II: This type of operation is so similar to that which a rapid deployment force force might today be called upon to perform that it has important implications for the development and refining of current doctrine.

In examining these implications, we may first note the use of the limited armor available (it was never more than five light companies) as a *maneuver force.* The Allied command had two reasons for initially concentrating its armor and not dispersing it among the infantry. First, the Americans had to quickly seize the Tafaraoui airfield. Secondly, because many



enemy coastal defenses precluded a landing nearer the objective, the attackers had to complete a fast overland movement to prevent Oran from being significantly reinforced.

But even on the third day when the opportunity presented itself for the use of armor to support a traditional combined arms assault on the city, Fredendall kept his available armor concentrated and used it to pierce a hole through the enemy defense rather than to crush it.

Obviously, there are tactical situations, where it might be necessary to parcel out armor to support infantry. But in situations similar to Oran, where rapid maneuver can resolve an uncertain political situation, massed armor seems to be the answer. The infantry could have used some tanks in the assaults on St. Cloud, but St. Cloud was not the objective. *If available armor is limited, one must mass it at the decisive* point.

If concentration of armor appears to be one lesson of Oran, redundancy in planning seems to be another. CTF did not rely on one strike force to eliminate the main threat to the success of the operation—French airpower. Three separate elements, TF Red, TF Green, and the airborne battalions, received the mission of securing Tafaraoui airfield. Should one or even two of the forces have been delayed or destroyed, another could have accomplished the mission.

Redundancy, then, should be a principle of planning in similar operations. It was insufficient redundancy that turned the 1980 Tehran mission into a debacle.

Finally, when one studies the Oran experience of 1942, one is struck by the *boldness* of the planners' concept of operations. Landing at widely separated points and sending small armored flying columns deep into a numerically superior enemy rear is not a cautious operational maneuver. But, I believe, boldness was desirable. Indeed, in the uncertain political situation that existed in 1942 at Oran, and which might exist should the U.S. Army be committed to some similar operation in the future, boldness might well be required. Lightning movement seems to have paralyzed the uncertain French and caused the main prizes—the port and airfields, to fall almost without a fight.

The ill-fated Operation *Reservist,* however, demonstrates that planners must not cross the border between boldness and recklessness. The plan for the 3/6 Infantry's *coup de main* appears so ridiculous in hindsight that it would be almost comical, were it not so tragic. If the Oran operation as a whole seems to bolster the arguments of those who favor the *maneuver* over the *firepower/attrition* approach to tactics, the *Reservist* episode should remind us that sometimes bold movement and *elan* are not enough.

Maneuver, and not firepower, seems, nevertheless, to have been the key to victory at Oran. Tafaraoui airfield was captured when American amphibious forces landed at a distance from the main enemy forces and struck rapidly with light armor into the enemy's rear. The Americans took the indirect approach. They did not attempt to use the firepower of the battleship to suppress coastal fortifications and attempt a frontal assault.

Similarly at La Senia, TF Green bypassed Misserrhin and struck between the enemy positions at Valmy and La Senia to seize a lightly defended airfield. Finally, on 10 November, CCB bypassed enemy positions leaving a strong force astride their communications at Valmy and LaSenia, and struck directly toward the port and French headquarters where French forces had been drawn in a linear-type defense with strongpoints south of the city.

Therefore, if we are looking for lessons for today from this operation, then concentration of armor, redundancy in planning, and bold and rapid maneuver seem to be those lessons. But we must be careful. At Oran, boldness and maneuver worked together against an irresolute and quickly dispirited enemy. Had the vital objective been St. Cloud, defended by the Foreign Legion, rather than the Oran docks, success would have required a traditional combined arms assault. Similarly, the deep strike maneuver conducted by light forces to seize Tafaraoui would have failed had the armored counterattack been made by a battalion of German *Mark IVs* or even French *CharB-1s,* rather than the pitiful *Renaults.* That fight was decided by weight of armor and caliber of gun, not maneuver.

The successful outcome of the battle of Oran in 1942 suggests that we might wish to copy today some of the methods employed by Fredendall, Oliver and Robinett. Especially striking are the parallels between the purpose—and the inherent difficulties, of the Oran operation and the type of missions likely to be executed by today's Rapid Deployment Force. But we must also remember that any lessons learned should be carefully assimilated. At Oran, bold maneuver of light forces worked well, and this action can and should be used as a precedent for those of us who advocate the rebirth of maneuver doctrine in our Army. We must not, however, permit reasoned advocacy to degenerate into unthinking sloganeering. Maneuver can enhance firepower, but it cannot replace it. Oran tells us that, too.

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Footnotes

[1] Members of the 2d Battalion, The Parachute Regiment, British Army, stated in a lecture at West Point on 1 December 1982 that the major lesson learned (or re-learned) during the Falklands fighting was the necessity for "all-arms cooperation." After having been pinned down for hours at Goose Green, the "2 Para" was delighted to have armored support for their final attack on Port Stanley.

[2] Oran was on the target list on 1 August, seven days after the 25 July decision was made to invade North Africa. See cables from Eisenhower to Marshall on 1 and 9 August 1942 in *The Papers of Dwight David Eisenhower: The War Years: I.* ed. Alfred D. Chandler, Jr., Baltimore: The John Hopkins Press, 1970, pp. 423,433 and 453.

[3] Information on French troops from Etat-Major De L'Armee de Terre, *Les Grandes Unites Francaises: Campaignes De Tunsie et D'Italie.* Vol. 4. (Paris: Impririsie Nationale, 1970) pp. 13-16, and LTC Bogardus S. Cairns, "Employment of Armor in the Invasion of Oran," *Military Review,* 28, No. 6 (September 1948), pp. 46-56.

[4] George F. Howe, *"Northwest Africa: Seizing the Initiative in the West,* (Washington, D.C.: Office of the Chief of Military History, 1957), p. 193.

[5] Ibid. p. 198 fn.

[6] See Mark Clark, *Calculated Risk: The Story of the War in the Mediterranean.* (New York: Harper & Brothers, 1950).

[7] The Allied plans and the narrative of events were taken from the following sources: H. R. Knickerbocker et al. *Danger Forward: The Story of the First Division in World War II* (Washington, D.C.: The Society of the First Division, 1947), George F. Howe, *The Battle History of the First Armored Division* (Washington, D.C.: Combat Forces Press, 1954), Paul McDonald Robinett *Armor Command* (Washington, D.C.: McGregor and Werner, Inc., 1958), and the works by Howe and Cairns cited in 4 and 5 above.

[8] See Edson D. Raff. *We Jumped to Fight* (New York: Eagle Books, 1944), for an account of this episode.

[9] For a more complete account of this operation see I.S.O. Playfair and C.J.C. Molony, *The Mediterranean and Middle East,* Vol. IV: *The Destruction of the Axis Forces in Africa* (London: Her Majesty's Stationery Office, 1966), pp. 146-150.

[10] Howe, *Northwest Africa,* p. 205.

[11] In both his works, Howe calls the French tanks "E-35s". I was unable to find any such tank in any compendium of WW II armor. Gen. John K. Waters, in a letter to me dated 7 February 1983, identifies them as *"Renaults".* There was a *Renault R-35,* so I have assumed this was the French vehicle. The official French Order of Battle *Les Grandes Unites Francaises* omits any data on the French forces which fought against the Americans at Oran. It merely gives a general overview of all French colonial forces from 1940 to 1943.

[12] John Waters to author, 7 February 1983.

[13] Howe, *Northwest Africa, p. 221.*

[14] Robinett, p. 54.

[15] Ibid, p. 55.

[16] Howe, *Northwest Africa, p. 227.*

Tactical Lessons For River Crossings

River crossings will probably be among the most inherently dangerous and extremely complicated tactical missions that will face us on tomorrow's battlefield. Executing them, even during an unopposed, peacetime training operation, can be mind-boggling. Add to that intense direct and indirect enemy fire, poor visibility, natural and man-made, plus battlefield confusion and the task seems almost impossible.

FM 90-13 "River Crossing Operations," provides today's soldier with a detailed description of how to plan for and execute a river crossing. This manual, if properly used, can provide an excellent training foundation for river crossing. In addition to the field manual, we can learn from experience gained during actual combat and from peacetime training exercises. It is worthwhile to examine an actual WW II river crossing operation and learn from the mistakes that were made.

During January, 1944, General Mark Clark was attempting to get his Fifth Army into Rome. An integral part of this operation called for Major General Fred Walker's 36th "Texas" Division to conduct an opposed river crossing of the Rapido River in southern Italy. The Rapido River was only a small stream, unmarked on some maps. The banks were between 25 and 50 feet apart, nearly vertical, and between three and six feet high. The water depth varied from nine to 12 feet.

Even though the river itself was unimpressive, the operation was a total disaster. In the two-day action that involved only two of the three infantry regiments of the 36th Division, the casualty figures were tragic—143 dead, 663 wounded and 875 missing. These figures do not include casualties in units that were attached to the division for the operation. General Walker wrote in his diary: "January 22 will long stand in my memory, as definitely as December 25 or July 4. Yesterday, two regiments of this division were wrecked on the west bank of the Rapido." The 36th Division encountered many problems during the course of this operation that led to the disaster. A discussion of this operation can be found in Martin Blumenson's *Bloody River, the Real Tragedy of the Rapido.* It is important for us now to highlight some of the problems that faced the 36th Division.

River crossings are the epitome of combined arms operations. During the Rapido tragedy, the orchestration necessary among the different players was lacking. As Blumenson wrote: "Most infantrymen resented or ignored orders given by the engineers. Lack of familiarity on the part of one branch with the techniques of the other provoked misunderstanding." Engineers, in fact, were scarcely involved in the actual planning of the operations. Planners failed to discuss with the engineers the technical problems associated with a river crossing. In fact, the crossing sites chosen by the engineers were subsequently changed by one of the regimental commanders prior to the operation.

The 36th Division did not lack engineers: a combat engineer regiment, a combat engineer battalion, and two additional engineer companies were in support of the crossing. But the engineers were ineffective, due primarily to lack of coordination and lack of protection.

The 36th Division conducted a rehearsal of the crossing, but changed units after the rehearsal and prior to the actual mission, causing one regiment to execute the crossing without any practice. Most importantly, the operation failed because the enemy had direct observation of the attempt. Initially, smoke generating equipment was lacking. Later on, too much smoke was used. Blumenson says: "A large amount of smoke had been put out during the day at Keyes' (corps commander) instruction—he later admitted his error in having ordered too much artificial haze—and it confused and handicapped the American artillery forward observers far more than the Germans."

Another problem at the Rapido was the marking of routes to the water. Blumenson wrote: "It was difficult to see the tape that marked the swept lanes, and in the darkness a man had to grope for the marker, then keep holding it while he followed the path. . . Inevitably some men walked into undetected and uncleared minefields."

The 36th Division also had problems getting the available bridging equipment up to the water's edge. This was caused not only by logistical snags in obtaining the equipment but also the actual mechanics of getting it to the river. After the equipment was at the water's edge, a large amount of it was destroyed by direct and indirect enemy fire.

What happened at the Rapido in January 1944 was indeed unfortunate, and it is definitely easy for us to play armchair quarterback and criticize the mistakes. It would be equally unfortunate, however, if we did not learn from those mistakes in order to avoid making them ourselves.

All players in a river crossing operation have a vital role: The infantry must make the assault crossing and secure the far side. The armor must provide direct fire support and then quickly exploit the crossing. Engineers must conduct extensive pre-crossing reconnaissance of the river and of the actual crossing sites and then emplace the bridge. Air defense must secure the bridgehead from enemy air attack. The artillery must provide supporting fire. Aviators assist in getting troops to the far side. Military police control traffic. Everyone is critical and everyone must know his job. This cannot be overemphasized and can be accomplished by using CPXs and TEWTs. When a practice crossing is made, it is imperative that the conditions closely simulate what we can expect to meet on the battlefield. We must be prepared for a *dirty battlefield.* Extensive obstacles should be emplaced at the water's edge. The operation must take place at night, or under the cover of smoke, or both. We cannot afford to overlook the importance of making the operation difficult in peacetime, because it most assuredly will be difficult in war.

Smoke assets are essential during a river crossing. We cannot allow the enemy direct observation, or we will

suffer huge losses due to the unavoidable concentration of men and equipment. Ideally, all river crossings would be conducted at night and personnel must be trained for this. However, if the operation is not ended by dawn, as was the case on the Rapido, we must be prepared to smoke it. Smoke will also be used at night, but it is obviously critical during daylight. Smoke must be controlled by the crossing area commander (under the control of the crossing area engineer). The need for smoke can be requested over the crossing area command net. The engineers monitor this net and can react instantaneously. Artillery-delivered smoke must be preplanned to include delivery of smoke to the far side of the river when necessary. Smoke generators and fog barrels can be ferried to the far shore in swimming vehicles. Floating smoke pots can be used to cover the actual crossing sites, and also to mark some dummy sites as part of your deception plan.

Entrance and exit routes to and from the bridge site must be clearly marked. Engineers or military police can serve as guides, as can your scouts. The routes away from the bridge site are as important as those leading to the bridge. The vehicles must have a clear path to a holding area or they will bunch up at the crossing and provide a lucrative target for enemy fire.

Luminescent lights (chem lights) are very effective in marking the lanes. Placing the lights in tin cans or U-shaped brackets makes the beacon one-directional and denies enemy observation.

It is imperative to have bridging equipment well forward so that it can be emplaced at the earliest moment. This seems to be obvious, but too many times bridging equipment is blocked behind maneuver battalions waiting to cross the river. With the equipment well forward, it is essential that it be concealed and protected. Tactical bridging equipment is an extremely lucrative target for enemy guns. This point is critical. It is definitely not easy to hide an entire company of mobile assault bridges or ribbon bridges, and the engineers must be allowed to choose a suitable pre-positioning location.

A deception plan must be worked out to confuse the enemy as to exactly where the crossing will be made. A trick that can work effectively is to set off numerous demolition charges at points along the river line. Engineers ordinarily use demolitions to clear obstacles at the water's edge, so the enemy merely has to listen for the sound and concentrate his fire on that point. By setting off many demolition charges simultaneously, it is extremely difficult for him to identify the actual crossing site. Command detonation under the assault forces commander (through his engineer) is critical to ensure simultaneous detonations. Individual unit commanders must not control detonations in their sectors.

Since we now have assault vehicles that can swim across water obstacles, a severe problem will exist with exit bank conditions when the vehicles leave the water. The appearance of bank (soil) conditions can be deceiving when seen only from the surface. Engineers must be given the opportunity to do extensive reconnaissance of the exit banks (preferably with scuba divers to check underwater conditions). Exit points must be clearly marked and vehicle drivers trained to steer directly for these markers. Engineers must have suitable bank preparation material to improve exit conditions if necessary. After the bridge is emplaced, bank conditions at the bridge site will progressively deteriorate. Gravel and earth fill can be pre-positioned near the bridge site to periodically improve these conditions.

Recovery vehicles must be positioned at the water's edge to assist in stalled or drowned vehicle recovery. As soon as the bridge is intact, a recovery vehicle must be sent across. A vehicle disabled on the bridge must be swiftly and ruthlessly removed, or the bridge is useless.

Practicing river crossing operations must have a high priority on everyone's training plan. Only through repetitive practice can we become proficient in this complex task.

RICKY LYNCH
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The End of the Tank?

Will the coming of the light division concept speed the end of the tank? That has become a common question in the armor-cavalry community as it observes the light division becoming reality.

Not to keep you in suspense, I believe the answer is, "Not at all."

To understand why the tank will survive, let's go back to the basics and rethink why the tank is on the battlefield in the first place. But first, let's agree on a few more general points.

In order to accomplish its fundamental mission—to inflict its will upon the enemy—an army must occupy the ground the enemy is on. This was as true at the battle of Marathon as it was in the recent Grenada action. We may have forgotten that fact in the relatively peaceful years since the great wars. While a powerful army is a deterrent in peacetime, once conventional fighting begins, you must push the other guy off the terrain.

Second, we probably agree that the combined arms concept remains the most effective combination to conduct warfare. This has been apparent since before the days of the catapult.

Finally, we should agree that the two preceding statements are likely to be true for the foreseeable future—the next 20 to 25 years. I have intentionally avoided a longer time period, but remember that even "Star Wars" had its All Terrain Armor Transports.

Now to the basics. Why did the British, at the urging of Sir Winston Churchill, invent the tank in the first place? As most people remember, it was because the Great War had congealed into the Great Standoff. Today's terrorist atrocities pale when compared to the grisly and futile infantry charges of that day, when ranks of men were mowed down in open terrain by machinegun fire. Hundreds of thousands of lives were lost with no perceptible progress by either side. So a need was born, a need for something that could cross trenches, break through obstacles, survive in hostile fire and, finally, kill the enemy.

This new monster incorporated these three functions, which have taken on the more graphic complexion of firepower, mobility, and survivability. Interestingly enough, our current *M1s* and *M60s* have those same basic functions.

We need now to discuss those functions in some detail, as that understanding is critical to accepting the thesis that the tank is not now—and will likely never be—dead.

I will define firepower as the ability to neutralize the enemy. This is not to contradict or deny General Starry's assertion that the operative word is to *kill* the enemy. Certainly, on today's battlefield, that is true. But in the larger sense, the purpose of firepower is to prevent the other guys from killing you. Only then can you inflict your will upon them.

But how does one do that? On today's battlefield, the mission requires long-range, accurate antiarmor fires, complementary weapons for nearer, softer targets, and a state-of-the-art fire control system.

Tomorrow, the best bet appears to be the 120-mm gun mounted on the *M1*. But what about after that? Is a large caliber weapon necessary? As the caliber increases, the number of rounds carried must be reduced if the tank's armor envelope is not to increase in size and weight. There are other penalties for getting bigger, so tank gun caliber is clearly not the simple answer.

What about the fire control aspect of firepower? Today's systems offer a solution to the ballistic equation based on inputs such as range, ammunition type, cant, wind, ambient temperature, barometric pressure, and ammunition temperature. Even so, at ranges in excess of 2,000 meters, accuracy falls off rapidly.

There are exciting technological developments on the horizon, systems that can identify and acquire potential targets, prioritize their threat potential, and direct your weapons, all in microseconds. But what is the right answer? Selecting the most promising systems is precisely the challenge faced by the technology base. Will the next generation of main weapons use electromagnetic guns or liquid air propulsion or high energy lasers? Whatever the final answer, the weapon must give us the ability to neutralize the enemy at medium combat ranges—up to 3,000 meters. We do not need line-of-sight weapons that kill at 7,000 meters.

The next function is survivability. This is the ability to avoid being neutralized. This probability can be expressed in the equation:

$$P_S = P_{A/B} \times P_{H/A} \times P_{K/H}$$

P_S equals the probability of surviving. $P_{A/B}$ is the probability of being acquired once in the battle area. $P_{H/A}$ is the probability of being hit, given that the tank is acquired. $P_{K/H}$ is the probability of being killed, given a hit.

The equation is intuitively appealing because it allows a better understanding of what contributes to survivability. For example, the chances of being seen, once you are in the battle area, are a function of the system's signatures, including sound, visual, and thermal signatures, given the enemy capability to detect them. The chances of being hit, assuming you are acquired, is a function of agility. (Since this entire discussion is hardware-oriented, the crew's ability to use the terrain was excluded.) The agility of a system is its individual quickness in moving from point to point on the battlefield and also its rate of acceleration, since an accelerating target is more difficult to hit than a target moving at constant speed.

At any rate, this agility is a principal factor in a system's chances of being hit, given that it has been seen. We should note here that these factors are not uniquely associated with each subset in the survivability equation. For example, the physical size of a target is a factor in both acquisition and the difficulty of getting a hit. Conversely, the agility of a system may make it difficult to acquire in addition to being difficult to hit. Nonetheless, this provides an estimate.

The third factor, ability to survive when hit, is a function of sheer armor protection, crew protection from blast and fire, and other protective measures.

Survivability has been the function most sensitive to threat capabilities as we have had no real breakthroughs in armor protection other than more armor or more weight. Yes, the *M1* has special armor, but it still weighs 60 tons.

The third function, mobility, should be considered in three perspectives: strategic mobility, tactical mobility, and agility. Strategic mobility, of course, is the ability of a system to be transported by existing or projected long-range transportation. This basically places limits on weight and volume. Tactical mobility relates to moving an entire unit a long distance using its own propulsion. For example, moving a tank battalion 100 miles to reinforce the critical point of attack depends on the tactical mobility of a system. Lastly, agility is the quality outlined earlier in this discussion, individual movement from point to point or dash-to-cover on the battlefield.

By now, those of you wearing tanks on your collar are probably thinking this is boring or redundant. But the purpose was to review what we all know. How does this relate to the light division or the light tank concepts? Quite simply, it is this: No matter what the perspective, wherever the Army's mission is to seize terrain, there will always be a need for a system which combines the best of those three basic functions—and we call it a tank. The reason for the discussion of the basics of tank functions was to provide the logical backdrop for that conclusion and to open our minds to consider the kind of technology that will give us a tank befitting the light concept. In other words, tank does not mean 60 tons of metal, or tracks, or a large caliber maingun. It means a system that can neutralize the enemy, survive on the lethal battlefield of the future, and that can meet modern standards of agility and strategic and tactical mobility.

This presents an exciting challenge to our future armor leaders. We have been challenged by Lieutenant General Fred Mahaffey to think beyond the next generation of vehicles. To maintain the intellectual flexibility to understand the basic principles of tank warfare in a new perspective is never easy. There may even be cries of "Heresy!" when one asserts that light tanks are entirely possible. Nevertheless, we must have the technology to provide acceptable levels of protection in a lighter armor envelope.

To finally set your mind at ease, I'd like to define light.

Light means a system that is transportable, that requires minimum cost to support, and that costs as little as possible to procure. There are those who would say that light and tank are paradoxical—that you can't have both. With today's technology, that is true. But the challenge is, what about the next generation? Or better still, the generation after that? Will it still be true?

Does the light concept mean the end of the tank? No. And, if one remembers the function of a tank, the answer is—ABSOLUTELY NOT!

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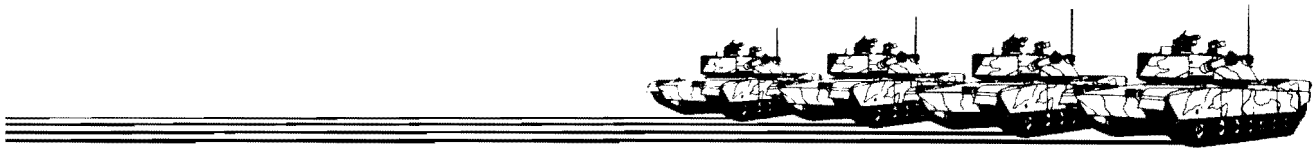

Survivability Notes

Survivability and vulnerability reduction are related but not identical factors. Armor contributes to survivability but armor alone does *not* necessarily ensure survivability in itself. Survivability is many things; it is a philosophy and a methodology. It includes things but is not a thing unto itself.

Survivability is a philosophy that says in order for our side to prevail, to outlast, to outfight our opponents, we must make it difficult for him to detect, see and hit us. If he does get a hit we must be able to ward off his lighter blows, and take, with minimum degradation of our capabilities, his most powerful blows.

In the context of a land combat machine, this means that it must be hard to detect, see, and hit with the attendant implications of the vehicle's signature, size, camouflage, agility, and both active and passive countermeasures. This also requires the provision of a basic level of armor protection against the more prevalent threats on the battlefield, typically smaller caliber bullets and shell fragments. More important, this means a system designed so that the defeat of the basic armor protection, even though locally severe, will have a minimum effect on our capability to continue operating as an effective fighting unit. The defeat of the basic armor envelope should result in graceful degradation, rather than the usual catastrophic loss to fire, explosion, or immobilization.

Survivability also requires that measures be taken to avoid "cheap kills" and unnecessary loss of life and vital materiel. This in turn requires the protection of the most vital component, *man,* so that he can continue to function effectively to prevail in the battle situation. Things which contribute to the loss of such capability must be avoided at all costs. This includes collateral damage to both men and equipment which might be avoided by simple measures and proper thought in the original system design.

Cost Considerations

The cost of survivability in any system should be considered in terms of the future implications if the necessary procedures are *not* implemented. Although today's dollars are the most felt and considered in the priorities of actions to be taken, the future cost in terms of national objectives, of human suffering, and of the dollars required to care for those who may be affected by the lack of consideration in today's designs, may easily outweigh the near term costs by orders of magnitude.

For example, in combat a seriously wounded man usually requires extensive attention and may in some cases even impede or reduce the ability of his mates to continue to engage the enemy in an effective manner. The seriously wounded man may need to be hospitalized for extended periods, possibly even for the rest of his life in a veteran's facility. His care will cost great sums of money, possibly for years to come.

Even a less seriously wounded crewman may impose a similar burden in the shorter-term context of the battle at hand. People who are hurting are often vocal and as a result may affect those around them with the consequences of loss of the concentration required to fight. A battle may be lost as a result.

A significant aspect of design for survivability is to do those things that minimize the probability of wounding personnel, while accepting that it is not possible to preclude loss of life to a locally intense weapons effect. A man killed outright is less of a problem than one that is severely wounded, and may in fact inspire others to fight even more effectively as a compensation for his loss.

Therefore, in the design of any combat system, whatever its intended operational environment (land, sea, or air), it is well to consider those things in the initial plan and configuration that will minimize the vulnerability and maximize the survivability of the critical elements of the system and its crew. These may cost virtually nothing if considered from the beginning. At the most, the cost should be small compared to the possible far-term costs if survivability procedures are not incorporated at the outset.

Examples of the cost of failure to consider design for survivability in combat are replete in the annals of modern combat. The article "Warship Survivability" by Rear Adm. Julian Lake, USN (Ret) in International Defense Review (6/1981) includes examples which apply to any combat system. The loss of H.M.S. Sheffield in the Falklands conflict in 1982 confirmed his predictions and the media has had a field day ever since about the vulnerability of ships (and therefore, by "logical extension," armored vehicles) constructed of aluminum (when in fact, the *Sheffield* was

one of the first all *mild-steel* vessels. The *Sheffield* was, however, in common with most of today's naval vessels, designed for habitability rather than combat survivability. The habitability materials and designs unfortunately contributed to the demise of members of the crew and eventually the ship itself. Along the same lines, why was the Argentine cruiser *General Belgrano* so easily sunk?

Conclusions

Survivability is many things, the most important of which is that it is a philosophy that must be introduced in the design of a system at its outset.

Survivability does not necessarily penalize the system in terms of cost or weight unless the designer is insufficiently aware of what should be done and unwittingly incorporates costly and possibly systems-degrading materials and sub-systems in the mistaken belief that they are the things of survivability. High cost, highly sophisticated defensive subsystems with inherent reliability limitations because of their complexity, may prove to be negative contributions to a system's survivability.

Survivability then, is the intelligent design of a system incorporating materials, systems, and personnel accommodations to enable that system to escape detection and avoid the opponent as long as possible. It must be able to completely resist some of the effects inflicted upon it when it can no longer escape being seen and hit. When hit and penetrated by a major effect, it must be able to, in effect, "roll with the punch" and fight back. The latter involves confining the effects of a major penetrator to the minimum swept volume so as to minimize loss of crew and fighting capability. Loss of sub-systems, supplies, and personnel is accepted, so long as their loss does not result in a significant reduction or catastrophic effect on the combat ability of the remainder of the crew and systems. Linearization of the penetrator's effect by countermeasures, such as spall suppression liners, is an example. Use of fuel and ammunition in distributed containers where they can act as a part of the armor rather than as the source of catastrophic failure is another. Armoring of the individual crewman to better enable him to take the "100-millisecond insult" inflicted by the penetrator is yet another. The design of the vehicle to avoid being "single-point-vulnerable" is critical even though it may require a change in current design philosophy.

Finally, for purposes of the present notes, *education* of those responsible for systems design in those things that need to be implemented in the original concept of the system to provide the sorely needed thing called survivability.

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Wartime Training

The U.S. Army has never gone to war fully prepared. There has always been a time lag between the declaration of war and the Army's full preparedness for that war. In a future war, we may well lack the time to draft, train and assign adequate numbers of highly skilled technicians to operate sophisticated military equipment.

The most pressing problem facing our manpower mobilization planners today is that of training base expansion. Many people are working hard on such problems as equipment, schedules, and facilities expected to be needed in the event of mobilization. But what is still needed is a basic overall concept around which to form operational solutions. We need a force expansion *strategy* because this strategy will decide both the draft and training systems, and ultimately the field commander's conduct of the war.

FM 25-5 (Draft), *Training at War*, mentions in Appendix C, a training philosophy for units only. However, it does not propose an overall approved training strategy which addresses all the factors involved.

WW II demonstrated time and again the inadequacies of our training and assignment policies. In some cases, infantry replacements were sent to armored units on the eve of battle. But the *M1 Abrams* does not lend itself to the kind of on-the-job training that was possible with the *M4 Sherman* of WW II. We cannot afford *ad hoc* training if we are to fight outnumbered and win.

Our current thinking regarding *wartime* training bears a suspiciously remarkable resemblance to our *peacetime* training concepts, although expanded. This is fine if we really *are* organizing for war and adapting for peace, as the military dictum goes. But I'm not sure we have done this. Our current training system fits into our peacetime army so well that I wonder if that's not exactly what it was designed for.

In approaching the question, "How do we efficiently use and train our people in a wartime situation involving force expansion and sustainment?" let me suggest five leading questions: On what assumptions is the current system based? How many of these assumptions repeat the errors of past wars, or are based only on peacetime consideration? What constraints must be taken into consideration as we think about fixes? What must be done to modify our system to accommodate the wartime training strategy and, how many of these modifications can we apply in peacetime to minimize the trauma of a crisis transition and still meet the economic restrictions imposed by the peacetime environment?

Some parameters, of course, are beyond our control. True, we could change them, but it would take significant time and effort and there is no guarantee of success. These

include: Individuals with no previous military experience must have at least 12 weeks of training before overseas deployment, according to Title 10, U.S. Code. Another assumption is that the current Selective Service System (SSS) policies and regulations will remain in effect and that new federal units will be manned with people drawn from a single geographic area because the SSS will issue a uniform national draft call by birthdate.

It is also assumed that only men will be drafted, starting with the 20-year-old age group through 25, then the 19 and 18-year-olds and that roughly 750,000 men from each year-group will qualify for military service. A further assumption is that there will be no student deferments longer than six months except for college seniors and ROTC cadets and that we will have to train a small number of conscientious objectors. The assumptions continue with the one that only doctors will be drafted, not other medical personnel, and that there will be industrial deferments of manpower in critical war materiel industries and in agriculture. Also, there will be other deferments, such as those for sole-surviving sons, but none of these will materially affect the mix of available personnel.

We can also assume that volunteer enlistments will continue and that there will be a qualitative distribution of military manpower among the services in proportion to the end-strength.

We will have 68 Military Entrance Processing Stations and 15 Army training centers and the system should produce maximum trained manpower in the minimum possible time. Although economy is a factor, it is not the primary one.

As additional aids to your thinking, here are the lessons learned about training, as listed in DA PAM 20-212, *History of Military Mobilization in the U.S. Army.*

"Individual basic training must be conducted in accordance with a well-formulated program, for a definite period of time, and under proper supervision. Adequate training literature and training aids should be planned for as part of the program. Individual training can be most economically imparted at training centers specifically entrusted with that mission. Individual basic training should be given to everybody to ensure flexibility of assignment and reassignment as needed.

"Unit training and specialist training are most efficient when they come after good individual basic training.

"Mobilization of manpower is best accomplished when it is guided by plans prepared well in advance.

"Military staffs in peacetime should function, as nearly as possible, as it is expected they will in wartime. The confusion caused by violent staff reorganizations during war must be avoided.

"The higher staff schools must be continued in operation.

"Mobilization plans must include provisions for both individual and unit replacement and rotation."

Finally, to complete the priming of your mental pump, I have compiled a list of questions which I have heard in my travels on the mobilization circuit. They are:

"What method should we use to accomplish expanded training? Should we train and retrain in units, use a pure individual replacement policy, or both? Should one-station unit training be continued in wartime?

If we have to build new units, where will the cadre come from? How do we integrate the long-lead-time MOS training with short- lead-time MOS training so that units are produced in the shortest possible time?

How can we solve the problem of high-tech MOS replacements? Could they be recruited for the Individual Ready Reserve in peacetime, acquire their basic skills in Army schools and hone those skills in relatively comparable civilian work, combined with periodic "regreening"?

Should we selectively overman existing National Guard/Reserve/active units in the needed wartime MOSs? Or should we create additional high tech units in the force structure specifically as high-tech MOS replacement units? Should we train in the same manner for partial, full, and total mobilization and how can we best use our existing 12 USAR training divisions which are specifically designed for the purpose of conducting wartime training?

With regard to these units, ask yourself how they can be used in the planning process and how they can best be trained to perform their wartime mission?

Other questions posed by the wartime training problem will include: Should we create a data base and model which will simulate the problems of wartime manpower allotment within and without the armed forces? Also, how do the accession, personnel management, transportation, and reception center systems interface with our wartime training concept?

Good luck and good thinking. Remember that you may be influencing your own future, either as an operator or as a user of the wartime training system.

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Recognition Quiz Answers

1. **FOX CVR (W)** (UK). Scout car armed with 1 x 30-mm Rarden cannon and 1 x 7.62-mm coaxial machinegun. Crew of 3. 104 km/hr maximum road speed; 434 km maximum road range. It weighs 6,836 kg (15,073 lbs). 4x4 drive.

2. **BTR-60PB** (USSR) APC. Crew of 2 plus 14 passengers. 8x8 drive. 80 km/hr maximum road speed, 10 km/hr maximum water speed. Armed with 1 x 14.5 mm machinegun and 1 x 7.62-mm coaxial machinegun. Armored from 5 to 9 mm. Weighs 10,300 kg (22,711 lbs).

3. **PANHARD EBR** (France). Armored car armed with 90-mm main gun and 1 x 7.56-mm coaxial machinegun. Crew of 4. 8x8 drive with center pair of wheels lowered for cross-country travel. 105 km/hr maximum road speed, 650 km road range. Weighs 13,500 kg (29,767 lbs).

4. **AML HE 60-20** (France). Armored car armed with 1 x 60-mm mortar and 1 x 20-mm cannon. Optional 1 x 7.62-mm coaxial machinegun and spotlight. Crew of 3. 600 km maximum road range, 90 km/hr maximum road speed. Armored from 8 to 12-mm. Weighs 4,800 kg (10,584 lbs). 4x4 drive.

5. **BRDM-2** (USSR). Amphibious scout car. 4x4 drive. Armed with 1 x 14.5-mm machinegun and 1 x 7.62-mm coaxial machinegun. Can be fitted with 6 x *Sagger* ATGMs. 100 km/hr maximum road speed, 10 km/hr maximum water speed. Weighs 7,000 kg (15,435 lbs). Armored from 3 to 14-mm.

6. **SARACEN** (UK) APC. Crew of 2 plus 10 passengers. 6x6 drive. Armed with 1 x 7.62 mm machinegun in turret and 1 x 7.62-mm machinegun on ring mount. 72 km/hr maximum road speed, 400 km maximum road range. Weighs 10,170 kg (22,424 lbs). Armored from 8 to 16-mm.

REGIMENTAL REVIEW

Keep 'em Clean; Keep 'em Rolling

Cleanliness is next to operational efficiency, or so the soldiers of 1st Battalion, 37th Armor could paraphrase the Biblical saying. They know, from experience, that clean equipment—organizational and personal—is vital to success in the field.

After a recent ARTEP at Hohenfels, FRG, the 1-37 soldiers spent several days in intensive vehicle and equipment cleanup. And then the platoon leaders and sergeants inspected everything. Just to make sure.

Said Sp5 Willie Billups of C Company, "You don't have to be in this unit long to realize that good equipment maintenance makes your life a lot easier in the long run."

"If we don't take care of our equipment, it can't take care of us," said PFC Salvador Moreno, also of C Company.

SGT Bruce Thomas of the same unit, said, "When it's very dry, dust is a real problem. Your engines need special attention and weapons must be cleaned daily. Cold weather causes moisture problems. In any weather, cleaning your field and personal gear is the toughest job." (From IRONSIDES).

Tankers Train With AVLB

Tankers of Company C, 1/110th Armor, 26th Infantry Division, MAANG, conducted platoon training including movements to contact, hasty attacks and hasty defense maneuvers recently at Camp Edwards, MA.

With the help of a platoon of "bridgers" from Company E (Bridge) 101st Engineers, 26th Infantry Division, eleven *M48A5* tanks practiced crossing antitank ditches on an armored vehicle launched bridge (AVLB).

1LT Richard C. Beecher, company commander, said a previous experience in trying to cross an antitank ditch had shown the importance of the AVLB and its bridge. "Back in September," Beecher said, "we had the engineers down here and they dug a tank ditch and we tried to get across without the AVLBs. We sank a tank and had to winch it out, so training with the AVLBs is necessary."

Beecher is enthusiastic about his unit's recent emphasis on field training. "The past year we've spent more time in the field than before. We are trying to orient our unit toward field rather than armory training. We have a lot of new people and the best way to learn the tanks is to be on them and out in them."

New Tank Gun Range to Give Better Data

The complexity of modern tank gun systems has set a requirement for more accurate down-range measurements of projectile flight and time-of-flight. The Materiel Testing Directorate of the Army Materiel Systems Analysis Activity at the Aberdeen Proving Grounds, MD, has come up with a new tank gun range that promises to provide the needed data.

The range has targets set at 800, 1,400, 2,000 and 2,500 or 3,000 meters, depending on the type of projectile fired, HEAT or KE. As the round passes through each target, its trajectory is automatically plotted and video cameras flash an instant picture to a central monitor. Additionally, photoelectric cells placed on the ground sense the projectile's flight over them and transmit time-of-flight data to a computer that collates this, and other data, for later use by the technicians.

Anemometers near the firing tank provide constant data on wind speed and direction since this information is vital to computing ballistic calculations.

A video camera is on the gun tube and in the gunner's primary sight to provide checks against aim errors and system pointing errors.

The new range is expected to provide more accurate data on projectile flight more quickly than has been heretofore possible.

PADS to Help Field Artillery Units

Litton Industries' Guidance and Control Systems Division has been awarded a $67.2 million contract to provide an additional 182 inertial survey systems called Position and Azimuth Determing System (PADS) to Army field artillery units. The Marine Corps has also purchased 40 of the new systems.

PADS is a self-contained, inertial survey system capable of rapidly providing position, elevation and azimuth readings to the fire support elements of the combined arms team.

The compact device can be jeep-mounted and the 82d Airborne Division will install them on the Army's new high mobility multipurpose wheeled vehicle (HMMWV). PADS is the first unit to provide continuous "real time" position information in the field.

Sergeant York Air Defense Weapon Tested

Sergeant York the Army's computer-controlled frontline air defense weapon that is designed to be effective against helicopters and high-performance fixed wing aircraft, has completed 9 months of testing at Aberdeen Proving Ground, MD. It is armed with two Bofors linkless-feed guns coupled to a radar system and a laser range finder. Gunners may use either a day-night optical system, a computerized fire control aiming system, or a combination of the two. The weapon uses a modified *M48A5* tank chassis and an *M60* drive train, and its fire control system is mounted in a hardened turret.

Further tests are scheduled at Aberdeen and the manufacturer's facilities.

1,000th MLRS Rocket Delivered To Army

LTV Corporation, the aerospace subsidiary of Vought Corporation, recently delivered the 1,000th production rocket for the company's multiple launch rocket system (MLRS). Each rocket is 13 feet long, nine inches in diameter, and weighs more than 650 pounds.

MLRS consists of a highly mobile, tracked launch vehicle and two sealed launch pod containers of six rockets each. They can be fired singly or in a ripple of two to 12 rockets in less than a minute and are said to be the most accurate rocket system in the world. The range is more than 30 kilometers.

Welcome To Fort Knox

Officers scheduled to attend the AOBC, AOAC, JOMC or the PCC may obtain a Fort Knox Welcome/Information packet by writing or calling: Commander, Company B, 1st Battalion, Center/School Brigade, USARRMC, Ft. Knox, KY, 40121. Autovon: 464-2841 or commercial (502) 624-2841.

AOAP Training Tape Copies Available at Fort Knox

The program manager for the Army Oil Analysis Program (AOAP), U.S. Army DARCOM Materiel Readiness Support Acitivity, Lexington, KY, has produced, in association with the Fort Knox TV Studio, a series of AOAP training tapes designed to provide information and instruction on the entire AOAP.

There are four tapes: "Aeronautical AOAP Sampling Procedures" (PAN A0515-84-0017); "Non-aeronautical AOAP Sampling Procedures" (PAN A0515-84-0011); "A Tour of the AOAP Laboratory" (PAN 515-84-0028) and "The AOAP Team" (PAN A0515-84-0029).

To obtain copies, send a blank 3/4" U-MATIC, 30-minute tape for each copy desired along with a completed DA Form 3903 specifying PAN number and title of each tape desired and the quantity desired. (One blank tape for each copy), to commander, U.S. Army Armor Center & Fort Knox, ATTN: DPT-TASC TV Branch (Mrs. Greer), Fort Knox, KY 40121.

Include your return address. If you cannot obtain blank tapes through your local TASC, phone Mrs. Greer at Autovon 464 3725/6745/6146 or commercial (502) 624-3725/6745/6146 for instructions.

Tank Fire Suppressants Tested at Aberdeen, MD

Tests are currently underway at Aberdeen Proving Ground, MD, to compare the fire-fighting effectiveness of carbon dioxide and Halon for use in *M60* series tanks.

Carbon dioxide is the most commonly used gas to extinguish fires. Halon, composed of carbon, bromine and fluorine is also recognized for its fire suppression capabilities and is used on the *M1 Abrams* tank and the *M2 Bradley* fighting vehicle.

Tankers Train With Support Arms

Soldiers from the 1st and 2d battalions, 72nd Armor maneuvered their tanks through a seven-station firing course at Rodriguez Range in Korea recently. They fired at moving and stationary targets in day and night conditions.

Crews were tested on their ability to use one or more of their tanks' weapons systems to locate, range and destroy the targets in 15 seconds, using a maximum of two rounds of main gun ammunition per target.

They were also scored on safety, crew drills, speed and accuracy.

But they probably wouldn't have concluded their successful training without the support of their own combat support companies, B Company, 2d Medical Facility (DISCOM), FAST (DISCOM), 702d Maintenance Battalion (DISCOM), 15th Field Artillery, 2d Engineer Battalion and the 1st battalion, 17th Infantry.

"It wasn't just a 1st Brigade effort," said one official. "We couldn't go to war without the support provided by these units and we appreciate their efforts."

Buffalo Soldiers To Hold Reunion

The 9th and 10th Cavalry Association (Buffalo Soldiers) will hold a reunion July 25-28 at Fort Worth, Texas. For information contact: Trooper John Hughes (817) 294-9298 or Trooper Jimmie Lizine (817) 536-3248 or write to the 9th & 10th Cavalry Association, Northern California Chapter, 3250 San Pablo Avenue #104, Oakland, CA 94608.

Kevlar Helmets Save Two Lives on Grenada

The 82d Airborne Division, which took part in the Grenada operation, has two soldiers who are glad they were issued the Army's new Kevlar helmet before they went into combat. One man was struck by a point blank round from an AK-47 rifle and the round dimpled the helmet. The other was struck by a large fragment of a 20-mm round and survived.

The new style helmets are made of an aramid fiber called Kevlar used in bullet proof vests. Kevlar is not a hard plastic and it's not fiberglass but a manmade woven fiber similar to that used to make automobile tire cord. The new helmets fit better than the old "steel pot" and are, therefore, more comfortable to wear for extended periods. They won't serve as wash basins, though.

4-40 Armor Crews Achieve Gunnery Qualifications

The 4th Battalion, 40th Armor recently achieved 100 percent gunnery qualification, according to SFC James Edmonson, battalion master gunner.

Quoted in the *Mountaineer,* Edmonson said, "the crews had to engage eight or more of 10 targets within specified time periods." The gunnery runs were made in daylight and at night.

The high company was the newly-formed D Company and the highest platoon was 2d Platoon, A Company.

Two crews tied for high place: D-14, 1st Platoon, D Company, and B-66, Headquarters, B Company.

The tank crews were evaluated on how well and fast they were able to engage targets. Trophies and individual plaques were awarded the highest scoring company, platoon and crew.

Cavalry Museum Opens New Exhibits

The U.S. Cavalry Museum at Fort Riley, Kansas, has opened two new exhibit galleries to the public. Visiting hours are: Monday to Friday from 9 a.m. to 4:30 p.m. and Sunday from noon to 4:30 p.m.

749th and 756th Tk Bn Reunions Set

The 749th Tank Battalion Association has scheduled two reunions this year. The first, the Association's 40th reunion, will be held from 16 Aug to 19 Aug at Marriott Twin Towers, Washington, D.C. 20024. Contact Colonel Jack Morris, USAF (Ret.) at 1800 Susquehannock Drive, McLean, VA, 22101, phone: (702) 356-4146.

The 749th's second reunion, the Far West area reunion, will be held from 12 Oct to 13 Oct at the Howard Johnson Motor Lodge, 122 West South Temple, Salt Lake City, Utah. Contact Colonel Jim Bobbett, AUS (Ret.) at 6780 Olivet Drive, Salt Lake City, Utah, 84121, phone: (801) 943-3203.

The 756th Tank Battalion Far West area reunion will be held from 12 Oct to 13 Oct at the same location. Contact Colonel Jim Bobbett, as above.

Fighting 6th Cavalry Reunion Planned

Veterans of the Fighting 6th Cavalry are reminded that their regiment is holding its reunion at the Quality Inn South, I-75 at East Ridge exit, Chattanooga, TN, on June 15-17. Reservations may be made by calling the motel at (615) 894-0440. a full schedule of events has been planned.

BOOKS

U. S. MILITARY WHEELED VEHICLES by Fred Crismon, Crestline Publishing, Sarasota, FL, 33577, 472 pages. $34.95.

The 18 chapters of this monumental reference volume cover every wheeled vehicle ever used, or considered for use, by the U.S. armed forces, including a 1-wheeler, motorcycles, amphibians, armored cars, gun carriages, 4, 6 and 8-wheel cargo trucks, fire engines, buses, and on and on. There are more than 3,200 excellent photos illustrating the text.

Each chapter is divided into classifications by weight and size and each class is described in chronological sequence. The book covers wheeled vehicles in the U.S. services from pre-1900 to the present day.

The author is preparing a second, companion volume that will include all the tracked and half-tracked vehicles "since the beginning."

This is an excellent reference volume and should be on the private shelf of every armor professional officer.

ARMOR MAGAZINE STAFF
Fort Knox, KY

THE RUSSIAN VERSION OF THE SECOND WORLD WAR, edited by Graham Lyons, translated by Marjorie Vanston. Facts on File Press, New York, 1983. $14.95.

The American edition of the original work published in Great Britain in 1976 is no improvement over the original. It is a highly propagandistic effort with little real scholarly impact.

It focuses primarily on the period from the massive German attack in June 1941 to Russia's rather belated entry into the war against Japan in mid-August 1945 and presents the view that Russia single-handedly won the war against Germany. It shows the Allied victories in North Africa, the D-Day invasion of France, the round-the-clock bombardment of Germany and the victory over the U-Boats as inconsequential efforts that came about only after the Soviets had defeated the Germans on the Eastern Front.

The book has little to offer to anyone with a genuine interest in the Russian campaigns.

JOSEPH E. THACH, JR., PhD
Fort Bragg, NC

TANKS & OTHER ARMORED FIGHTING VEHICLES, 1942-1945, by B. T. White. Sterling Publications, N.Y. 1983. 152 pages. $9.98.

This is one of the Blanford Press (U.K.) series titled, "Mechanized Warfare in Colour" and contains 80 color plates of WW II AFVs, each with a short discussion of the vehicle shown.

Serious modelers will be interested in this book for it not only shows the standard tanks and self-propelled artillery of WW II but such specialized armor as recovery vehicles, bridging equipment, and mineclearing vehicles. In some cases, standard color numbers are given to aid in painting models and the comparative data tables for the vehicles include such information as bore size for the British "pounder" tanks. For instance, the British 2-pounder was actually 40-mm in caliber.

While not as definitive as some on the market, this book is good value for the money and is recommended for anyone starting a library on armored vehicles.

GERALD A. HALBERT
Earlyville, VA

ROMMEL: A NARRATIVE AND PICTORIAL HISTORY by Richard D. Law and Craig W. H. Luther. R. James Bender Publishing, San Jose, CA, 368 pages. $17.95.

Vice Admiral Ruge says in the forward, "This book is probably the most definitive work on armored warfare to emerge from Rommel's campaigns."

Rommel first gained fame in WW I as an infantry captain and in WW II won additional laurels in Poland and France. His posting to North Africa marked the pinnacle of his career.

The entire North African campaign is documented and covers every aspect of desert warfare and armor operations. Of particular importance was the role of the intelligence forces on both sides. The Allies had broken the German codes and were intercepting messages and troop and supply movements which was the prime cause of the German/Italian defeat in the desert.

Rommel's suicide at the hands of the Gestapo was, the author claims, an irrepairable loss to Germany.

WILLIAM L. HOWARD
Lieutenant Colonel, Armor
Springs Lake Heights, NJ

THE CONTINENTAL ARMY by Dr. Robert K. Wright, Jr. Center of Military History, U.S. Army, Washington, D.C. 20314. 451 pages, $15.00.

This is the third volume on specialized aspects of the War of American Independence. It explores in detail how the regular forces were organized and where they fought and provides historians and genealogists with an exceptionally useful reference tool.

The first of three parts deals in a narrative way with the organizational evolution of the troops serving under the authority of the Continental Congress. The second section consists of the lineages or outline histories of the 177 individual units that composed the Continental Army. The final section is a massive bibliography. Ten pages of full color illustrations and 54 black-and-white pictures are included.

The Continental Army should become a widely used source of information and be of interest to specialists, the military community, genealogists and local historians.

ARMOR MAGAZINE STAFF
Fort Knox, KY

AN ILLUSTRATED GUIDE TO MILITARY HELICOPTERS by Bill Gunston. Arco Publishing Co., New York 1981. 159 pages. $8.95.

Heliborne mobility is a key factor in military operations and helicopters play major roles in armies, navies, and air forces where they do a myriad of jobs formerly done by ships, tanks, fixed-wing planes, and men. And quite often they do it better.

This book is a fine compilation of attack and support helicopters dating back to WW II. Fifty-one aircraft are described and illustrated with line drawings and photographs. Details of manufacturer, aircraft type(s), engine(s), dimensions, armaments, etc., are included as well as historical commentary that not only provides information on the older models, but puts into focus the roles of helicopters in later wars.

This book should be in the library of the casual aircraft observer, the helicopter pilot, and the helicopter mechanic. It effectively bridges the gap between technical tomes and the (often) misinformation found in the popular press.

ROBERT P. ARNOLDT
Oak Park, IL

AN ILLUSTRATED GUIDE TO WEAPONS OF THE MODERN SOVIET GROUND FORCES, by Ray Bonds. Arco Publishing Co., NY. 160 pages. $8.95.

This large pocket-sized handbook is one of a series all of which pertain to military weapons and equipment of all nations since 1939. This volume describes in some detail the equipment of Soviet ground forces. All aircraft are omitted, even those that directly support ground forces. There are 16 chapters ranging from "Main Battle Tanks" to "Rear Services Equipment."

JAMES F. GEBHARDT
Captain, Armor
Fort Ord, CA

STEEL ON TARGET

The call went out and the soldiers responded to the no-notice exercise as they had done so many times before. But pulses quickened as the NCOs issued live ammunition and the officers returned from their huddle with the news that this was not a drill. A few hours later, veterans and rookies stepped into the prop blast and greeted a dawn streaked with tracers arching up toward their canopies. But the descent on the Port Salines airfield was too swift for sightseeing and the battle on the ground was quickly joined in earnest.

The recent events in Grenada point out that an Army of a free people chooses not where it will fight, whom it will fight, nor when it will fight. But a lesson not soon lost on our adversaries is that such an Army can choose how it will fight and in so doing will define the shape and tempo of the battle.

The example of that recent operation points out that in the march to modernization, the best blend balances the tried and true with the most promising elements of the new. While the high-tech battle raged between Spectre gunships and ZSUs, the battle on the ground was decided by toughened troops who shot straight and played for keeps.

Whether high-tech or low, the stakes remain the same and our aim is clear. We fight where we are told and we win where we fight by seizing the initiative either on the high frontier of technology or in the trenches with tank guns and bayonets.

Unlike the other branches and services, in Armor we must be prepared to go to war tomorrow morning and fight and win both ways — high-tech or low-tech. This means we must maintain expertise in the high technology hardware of our branch, but at the same time must maintain a physical, mental and emotional state that will allow us to move from peacetime pursuits to wartime stance overnight. To that end we train hard physically and study our professional lessons diligently in order to defeat the Threat with brains and brawn alike.

But, how do we prepare emotionally to leave loved ones on a moment's notice to fight in a desperate winner-take-all struggle?

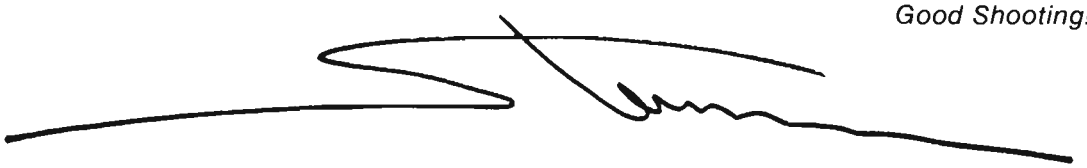
A clue is found in our sense of professionalism. We live our daily lives preparing for war so that others may live at peace. We develop a sense of detachment for the trappings of our society not unlike that of religious orders who forsook the search for power, wealth, and the good life for the brotherhood found in the company of good men serving the cause of peace.

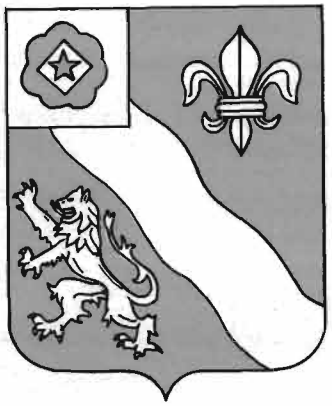
Our brotherhood doesn't take religious vows of poverty, chastity and obedience, but instead, bands together in regiments and serves the ethical code of duty, honor and country.

That code is strict and means that our lives are not our own, but, rather belong to all those we protect, including family, friends, neighbors, the guy in the street and those oppressed by others who lust for power.

Wellington said that the Battle of Waterloo was won on the playing fields of Eton. Let those who would test our resolve to defend the cause of peace reflect that the high-tech/low-tech battle of tomorrow will be won not only on the football fields and in the computer classrooms of our nation's schools, but through the brotherhood of good men banded together in regiments, serving the cause of peace under the banner of duty, honor, country.

Good Shooting!





Symbolism

Green is used for armor. The wavy band is from the arms of the Rheinprovinz and indicates service in that area and in Central Europe, while the fleur-de-lis is for service in France and the French citation for Collerville. The rampant lion from the arms of Belgium represents the Belgian citations for Mons and Eupen-Malmedy. The canton represents descent from the 745th Tank Battalion, from which these honors were inherited, seven being represented by the septfoil, four by the square, and five by the star. The Siegfried line is symbolized by a dragon, the collar about his throat signifying the capture of the line after it was breached by armor units. The morning star, a type of medieval club, alludes to the reduction of the city of Aachen.

Distinctive Insignia

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

63d Armor

Seek, Strike, Destroy

Lineage and Honors

Constituted 3 May 1942 in the Army of the United States as the 745th Tank Battalion. Activated 15 August 1942 at Camp Bowie, Texas. Inactivated 27 October 1945 at Camp Kilmer, New Jersey.

Redesignated 14 September 1948 as 63d Heavy Tank Battalion, allotted to the Regular Army, and assigned to 1st Infantry Division, activated 10 October 1948 in Germany. Reorganized and redesignated 10 October 1950 as 63d Tank Battalion. Inactivated 15 February 1957 at Fort Riley, Kansas, and relieved from assignment to 1st Infantry Division.

Reorganized and redesignated 25 January 1963 as 63d Armor, a parent regiment under the Combat Arms Regimental System.

Campaign Participation Credit

World War II

Normandy (with arrowhead)
Northern France
Rhineland
Ardennes-Alsace
Central Europe

Decorations

French Croix de Guerre with Palm, World War II, Streamer embroidered NORMANDY (745th Tank Battalion cited; DA GO 43, 1950)

Belgian Fourragere 1940 (745th Tank Battalion cited; DA GO 43, 1950)

Cited in the Order of the Day of the Belgian Army for action near MONS

Cited in the order of the Day of the Belgian Army for action near EUPEN-MALMEDY