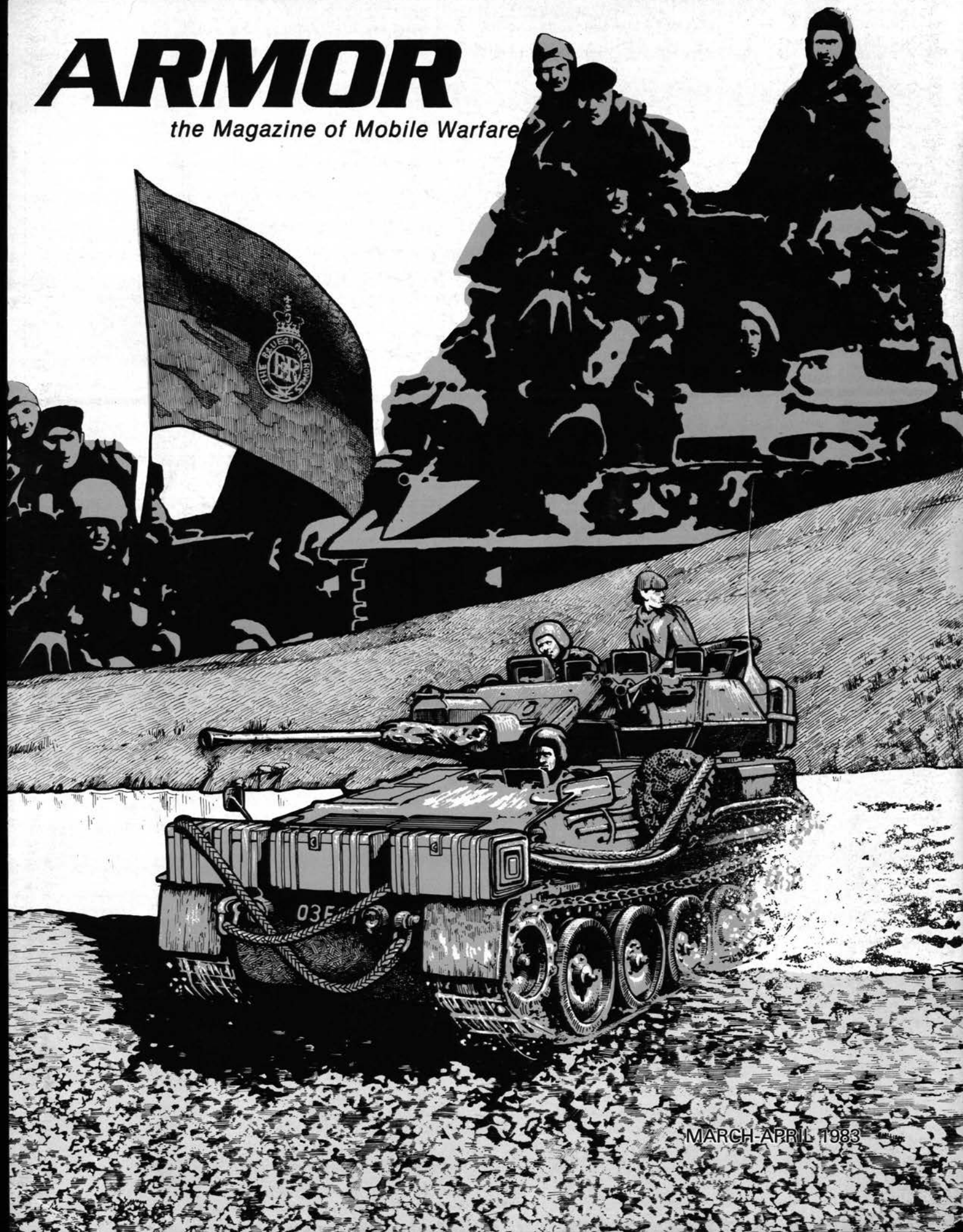


ARMOR

the Magazine of Mobile Warfare



MARCH-APRIL 1983

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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MAJ CHARLES R. STEINER, JR.

Managing Editor

ROYCE R. TAYLOR, JR.

Assistant Editor

ROBERT E. ROGGE

Administrative Assistant

JEANNIE NEWTON

Contributing Artists

GARY W. WILLIAMS

MARK IRWIN

DON ENGLER

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COVER

The Blues and Royals, part of the Household Cavalry, although few in number, provided armor support for the British Army's battle in the Falkland Islands campaign. Lieutenant Colonel Andrew R. Jones, Royal Tank Regiment, liaison officer to the USAARMC, tells the story on page 26.

The Price of Leadership

Dear Sir:

I appreciated very much your article "The Price of Leadership" (ARMOR November-December 1982). Your first paragraph condensed the quintessence of leadership and the ethic of the military leader: Whatever his technical ability, his knowledge of warfare, or his sense of dedication and duty, a leader will never attain top efficiency in his unit if he does not understand that to command soldiers demands a real and total self-denial.

You say, "When leaders cross the line of departure they do not look back." I agree. Their subordinates will follow them without hesitation because they have confidence in leaders who, before D-Day, endeavor to earn this of their subordinates by creating an environment of friendship and pride—sources of unit cohesiveness.

The day before relinquishing command of my regiment, I had a conversation with the commanding general who asked me what I thought about my time in command. My main feeling, I answered, was that I had spent about two-thirds of my time helping, advising and protecting my subordinates in order that they could perform their duties as well as possible. My general replied, "Yes, that is the price of leadership."

ANDRE L. RILHAC
Colonel, Armor
French Liaison Officer, Ft. Knox

Reliable TC-Driver Commands

Dear Sir:

There is a gap in armor crew control. I doubt that anyone will challenge the need for fire commands, but another item just as important has been left out of crew control and that is driver commands.

Change the driver or TC on a vehicle and watch the problems of movement control. How far will a driver turn, or how far does a TC want the vehicle to turn on a left or hard left command? How does a DC tell a driver to stop gently or stop so the vehicle will not hit a mine? This problem can easily be solved by using a much abused tool—standardization. The following is a list of commands that I use to control my drivers:

Left, right—driver keeps turning the stated direction until told otherwise. (Be careful that the turret facing does not fool you.)

Straight—driver keeps the vehicle going approximately in whatever direction the vehicle is facing, and as exactly as possible when in reverse.

Halt—the command to cease vehicle movement gently.

Stop—the command to cease vehicle movement in an emergency with full braking power.

Forward—the command to move in the direction the vehicle is facing.

Back Up—the command to move the vehicle in reverse.

These simple commands can solve a serious and potentially fatal problem faced by all armor vehicle crews. If a TC or a driver is replaced there is little effect on the ability of a vehicle to shoot and communicate, but what will be the effect on movement—Armor vehicles shoot, *move*, and communicate. We have a common language for two of these functions, why not all three—

CHRISTOPHER F. SCHNEIDER
INARNG

Queries CSM's Stance

Dear Sir:

Reference to CSM Gillis-article, "Additional Thoughts," in the November-December ARMOR.

The article leaves me with the impression that CSM Gillis is stepping outside the boundary of the role of the CSM. The CSM is "the" enlisted spokesman to the battalion/squadron commander and not, as his article implies, that he may step into the realm of officers by having them meet him in his office.

Any officer worth his rank knows that it goes without saying that any unit cannot function without a strong NCO chain.

The statement of making the squadron commander the "best commander" implies that he is more concerned with the betterment of the commander and not of the troops.

I don't want CSM Gillis to think I am telling him how to conduct his daily affairs with his commander, but to reconsider how his article was written. I believe the role of the NCO is a viable asset to any unit and that the unit is as strong as its weakest NCO, and every effort should be directed toward that weak point. This procedure will enhance the career of any commander and not by the sole efforts of one command sergeant major.

RICHARD E. OWEN
Sergeant Major
2-123d Armor, KYARNG

CSM Gillis Replies

It is unfortunate that SGM Owen either missed the point of my article or did not express himself sufficiently enough for me to understand the point he was trying to make.

I have reconsidered how the article was written, as he requested. I find, as I have absolutely no control over the "impression" that he elects to draw from it, or his perception on what is "implies", that the article adequately states what I intended it to state. Perhaps if SGM Owen will read the article again, paying attention to *how* I was au-

thorized to in-brief new troop commanders and *who* authorized me to do so, as well as the key word "privacy", in reference to "my office," the impressions and implications he has initially drawn would change.

Recognizing that there are those much more proficient than I in the "art of the written word", what is important is the "bottom line." That "bottom line" is if all the company/troop commanders, first sergeants, battalion commanders (I also briefed them before they took command while assigned as a brigade CSM), command sergeants major and brigade commanders that expressed how valuable this in-briefing was in exercising the command of their units by being better able to serve their soldiers, were in fact telling the truth (and I believed everyone of them), then this in-briefing is one of the "efforts" that the command sergeant major should take advantage of.

JOHN W. GILLIS
Command Sergeant Major
USAARMC, Ft. Knox, KY

Specialist/Sergeant Duties

Dear Sir:

The Specialist/Sergeant controversy article in the November-December 1982 ARMOR magazine by CSM John W. Gillis presents a compelling position for not converting specialists to sergeants. However, in my opinion, he seems to be overly concerned about the possibility of a technical proficiency overloading the leadership selection and promotion process.

I would hope that the sergeant major recognizes the cold, hard, fact that our Army, his and mine, is going to continue to become more technically based. This demands of leadership a better understanding and education in the area of technology that can and will affect the weapons systems employed by those they lead. The leadership structure will, of necessity, be required to assume full leadership responsibility in order to bring the battle to a successful conclusion.

If current leadership cannot accept the fact—that cold, hard fact that technological leadership is an integral part of the overall leadership structure, then our Army is in for a serious problem.

ROBERT A. WILLIAMS
Master Sergeant USA (Ret.)
Woodbridge, VA

7th Cavalry Symbolism Queried

Dear Sir:

First let me say that I greatly enjoy your excellent magazine. I do feel, however, that as the "official" custodian of the Cavalry Journal you should be much more careful.

In your research, I am speaking of the section titled "Symbolism" on the back cover of the September-October 1982 issue. You state, and I quote "... after its virtual extermination in the Battle of the Little Big Horn in 1876 ...". Losses at the Little Big Horn were 268 men. This was unquestionably severe, but since the regiment numbered over 700, it hardly qualifies for virtual annihilation. There are enough myths about the Little Big Horn. Please don't be a contributing factor.

MIKE KOURY
P.O. Box 2243
Ft. Collins, CO

(The symbolism material in the above-mentioned unit history was extracted verbatim from Army Lineage Series, Armor-Cavalry, Part I, printed by the Office of the Chief of Military History, US Army, in Washington, D.C. We contracted the institute of Heraldry, US Army, which prepared the symbolism material, and find that Mr. Koury's criticism is correct. We have been advised by the Institute of Heraldry that a correction to the lineage series will be published.)

1st Armored Division Commander Upheld

Dear Sir:

Reference is made to the article by Captain William R. Betson, "Sidi Bou Zid—A Case History of Failure," appearing in the November-December 1982 issue of *ARMOR*.

I would agree with Captain Betson's thesis that there is much to be gained from the study of operations which fail to produce the results anticipated. I would also agree that the operation of US forces in North Africa during the early days of WW II are worthy of study and might very well provide some valuable lessons. There is no quarrel with Captain Betson's point that the principles of war are universally applicable.

On the other hand, the captain's article suffers from several inadequacies. In the first paragraph, he alludes to the blunders of Major Generals Lloyd Fredendall and Orlando Ward. In the third paragraph, it is asserted that the German superiority in tanks and antitank guns were offset by US superiority in artillery, infantry weapons and "general issue." This assertion would be difficult to sell to any soldier familiar with the German weapons of the time when compared to the US halftrack tank destroyers and the M3 *Grant* with its low-velocity 75-mm gun. When confronted by the German *Tigers*, the *Grants* were simply unable to compete. This is noted when it is stated that the *Grants* could not close the range sufficiently to be effective.

The article implies rather clearly that Major General Orlando Ward, commanding the 1st Armored Division, was an incompetent in the opinion of the corps commander. It is further stated that the corps commander bypassed the division commander, issuing instructions directly to the combat commands of the 1st Armored Division. The truth of the matter is that General Ward was not in a position to really command the 1st Armored Division,

and there was nothing he could do about it. To make a judgment that General Ward was incompetent, as the author does, is subject to serious questioning.

Perhaps an examination of the later history of the two commanders would shed some light on their capabilities. The corps commander was relieved and returned to the US where he served out the war in positions where tactics were not involved. General Ward, on the other hand, returned to the US and was given command of the 20th Armored Division, which completed its training under his guidance and participated in the final campaign of the war in Europe. Only one other general was so honored, Major General Terry de la Mesa Allen, who commanded the 1st Infantry Division in North Africa and the 104th Infantry Division in Europe.

During WW II, serious efforts were made to profit from the experience of units involved in the earlier stages of the conflict. Teams of observers, personnel returned to the US because of wounds, and personnel reassigned to the US were all used to pass on to the troops the lessons which had been learned. The experience of the 1st Armored Division in North Africa was widely reported to units in training.

Perhaps I have been somewhat critical of an article with whose purpose I agree. On the other hand, I find it regrettable that unsupported assertions concerning the competence of a fine soldier should be included in an article when they are not even relevant to the issue being discussed.

JAMES M. SNYDER
Colonel, Armor (Ret.)
Alexandria, VA.

Sidi-bou-Zid: Another View

Dear Sir:

I congratulate Captain William R. Betson on his article (November-December 1982 *ARMOR*) on the Battle of Sidi-bou-Zid. It was obviously well researched and a definite contribution to history.

During the battle I was G3 of the 1st Armored Division, then commanded by General Orlando Ward. After the war, I delivered a lecture on the battle a large number of times—at least three times at the Command and General Staff College. It was not to be expected, but I wish Captain Betson could have asked me for a copy of my lecture. It would have provided some information and incidental color to his account.

As the G3 (operations officer) of the Division, I must, of course, share with General Ward (now deceased) any criticism due him on the tactical handling of 1st Armored Division troops under his control. It should be emphasized, however, that very little of the division was under his control. Missing were four and one-half of six tank battalions, two of three infantry battalions and one of three artillery battalions. However, and even more important, what little remained ostensibly under the control of General Ward (which included the attached 168th Infantry Regimental Combat Team) actually wasn't: component parts, down to companies, were located and instructed in detail by the corps commander, as Captain Betson plainly indicates.

Ward, to all intents and purposes, was out of the chain of tactical command.

I shall not enter into a discussion of the difficulties between Generals Ward and Fredendall, the corps commander, except to say that they were very severe and in very large part the explanation for the mishandling of our forces. To that I will add that I considered General Ward a very able commander and an excellent tactician. But for him to have avoided the debacle would have required a disobedience of orders or a formal high level protest of them. I am reasonably sure that he did make some sort of informal protest to General Eisenhower's headquarters, but it had no discernible effect on the situation in the forward area.

At division, a crucial and painful decision point came on receipt of orders (which Captain Betson says were initiated by Army headquarters; my notes show that corps initiated them) to attack to restore the previous position at Sidi-bou-Zid, which by that time was held by an enemy which Betson says was *known at the time* to be of divisional strength. I don't know who "knew" that—certainly HQ 1 AD did not.

Moreover, Colonel Hains (CO, 1st Armored Regiment and second-in-command of CC A, which was the force driven out of Sidi-bou-Zid the day before) and Lieutenant Colonel Hightower (CO, 3d Battalion, 1st Armored Regiment, which fought well as part of CC A the day before) also didn't know, if one is to believe the account of the battle composed (with the aid of other surviving officers) in prison camp by the then Lieutenant Colonel Alger, CO, 2d Battalion, 1st Armored Regiment, whose battalion led the counterattack. To quote Alger: "Colonels Hains and Hightower arrived (about noon when the attack force was in formation and at the point of moving out) and gave a few further details of yesterday's fight, mentioned probable location of AT guns in outlying houses around Sidi-bou-Zid, wished us luck, and hoped we'd get four to one in our favor." Those remarks could not have been forthcoming from two highly responsible officers if they "knew" that Alger's small force faced the equivalent of an entire German *panzer* division.

This is not to say that there was *not* the equivalent of a *panzer* division in the Sidi-bou-Zid area—there was, as later events proved. But such was the state of air and ground reconnaissance (the latter hampered by the fact that there were lots of desert mountains for the Germans to hide behind) that the combat echelons didn't know it at the very moment of counterattack.

Alger's battalion actually got into and beyond Sidi-bou-Zid, but of course the town itself had no great tactical significance. Some time later, after the Germans had withdrawn, I cruised the area and noted that most of Alger's tank hulls were south and east of the town, but he explains that by the fact that after some elements got beyond the town they turned back in reaction to a German counterattack from the south.

Alger and his officers claimed the destruction of 23 enemy tanks, 9 AT guns, 100 personnel and a number of trucks and other equipment.

Division headquarters should have protested the mission, for we did have reason to believe that with the troops at hand (Alger's

battalion had to be released to us), the mission was next to impossible. How much the division commander or chief of staff did protest, I do not know. I still wonder sometimes what I should have done that I didn't.

My lecture notes say that the effort saved a complete day for the allied (British and American) forces, allowing successful withdrawal through the pass northwest of Kasserine (misnamed Kasserine Pass) and preparation of the defenses west of the pass which eventually turned back the attackers. I think this assessment is correct.

There is a point to be made here about combat readiness. It has direct bearing on our ability to fight that part of the next war which will be fought in Europe or the Middle East.

The 1st Armored Division left Fort Knox in March, 1942. It was presumably a well-trained division, but one that had devoted the previous several weeks to closing out of Fort Knox with all its equipment. It spent most of two months moving, by echelons, to Fort Dix, another month and a half moving to northern Ireland where it remained for five months and endeavored to train under very unsatisfactory conditions.

It then spent two months shifting by echelons to England and getting ready to go to North Africa, where part of it made a largely unopposed assault landing against the French in December, 1942; the balance arrived in January, 1943. Shortly thereafter, it encountered veteran German troops, including parts of the *Afrika Korps*.

In other words, the division spent eleven straight months in what was essentially a nontraining status before being introduced into heavy combat against a seasoned enemy. Our soldiers, to a great extent, had forgotten their training, and our officers and NCOs their tactics and techniques.

The lesson is worth remembering.

ARMOR is to be congratulated on running Betson's article. It would do well to publish more on the battles of WW II. It was the last war to be fought against a modernly equipped enemy with airpower.

HAMILTON H. HOWZE
General, USA (Ret.)

Telfare Devices In Combat

Dear Sir:

I also saw the US NEWS & WORLD REPORT photo of an M60-series Israeli tank in Lebanon with a Telfare-like .50-caliber mounted on the main gun.

Luckily, our AOAC class has an Israeli lieutenant colonel attending, and he explained this curio.

It is an ordinary Telfare-type subcaliber training device. The feeling of the Israeli forces is that there is no need to remove it. It doesn't interfere with operations, and during extended occupation duties it is available for gunnery training. How's that for a common sense approach?

C.A. KORJO
Captain, Armor
Ft. Knox, KY

704th TD Bn. Says Thanks

Dear Sir:

On behalf of our association, I'd like to thank you for publishing our request for former members to contact us. ("News Notes," *ARMOR*, November-December 1982). It is through publications such as *ARMOR* that our membership has risen from 25 to 250. We are grateful.

WALTER C. RIGHTON
29 West Wilkens Lane
Plainfield, IL, 60544

Where Does The XO Fit?

Dear Sir:

We've read the recent article by Major Boyd and the responses. (See Professional Thoughts, "The XO As Commander," January-February 1982 *ARMOR*.) We feel compelled to add our thoughts.

I speak (Maj. Ardisson) from having been an armor battalion XO in USAREUR for 18 months, with 6 more to go. I've held this position under two different battalion commanders, and have worked with two different headquarters company commanders and will shortly break in a third.

To place the battalion XO as the HHC CO is not very sound. If the XO works properly with the HHC CO, they will have nearly common goals—"his are mine and mine are his." You might compare it to a wrestling tag team.

Applying this approach does not leave the staff NCO torn between two or three masters as SFC Wheeler suggests. (See Letters, November-December 1982 *ARMOR*.) The XO directs the staff NCO and the HHC CO inputs to the staff NCO—both with the same goal and prediscussed guidance and suspenses. Careful orchestration is essential since the XO, not the HHC CO, prepares the enlisted efficiency report (EER) of the staff NCO. Again, with dialogue and simple common courtesy, the HHC CO is given the opportunity to review and discuss differences of opinion with the XO before the EER is finalized. In our situation, spanning more than 15 months, changes from this process have been nil.

In garrison, the HHC CO is just that, a green tabber. The XO is the chief of staff and the logistical readiness officer. The HHC CO concentrates on his 64 vehicles and the support of his 188 men, while the XO oversees maintenance, all classes of supply, the mess and medical, not to mention administration, intelligence/security and operations training. In our view, to roll these functions together will cause the execution of both to suffer and bring about premature burnout of this unlucky, overworked person.

The tactical environment is where the real disadvantage is seen. The HHC CO has traditional roles; i.e., move the tactical operations center (TOC) or perhaps lead the quartering party, and most recently, be "mayor of the TOC." The XO, on the other hand, is the logistical whip cracker. The HHC CO runs the exterior of the TOC while the XO is inside the TOC and operates rearward through the combat and field trains to the brigade support

area (BSA). These jobs are mutually exclusive and do not lend themselves to one master if both are to be done well on the fluid, non-linear battlefield.

If change is really needed, and from where we sit it is not, the thought should be to dual-hat the XO as the headquarters commandant, and then the HHC CO would answer to him and really give up his green tabs.

As stated earlier, if a dialogue is maintained between battalion XO and the HHC CO, the goals are mutual and shared, the *status quo* is good to go!

RICHARD L. ARDISSON
Major, Armor
4th Inf. Div. USAREUR

PAUL M. WILSON
Captain, Armor
4th Inf. Div. USAREUR

An XO Speaks Up

Dear Sir:

I have read the Professional Thought, "There Are No Excuses for Poor Training," (November-December 1982 *ARMOR*) by Major Stoll. It is not necessary to refute any of his analyses of the factors that have taxed the wits of many an excellent company commander for decades. They are as operative now as when Major Stoll used them during his years in command.

In approaching the 12-month mark in my own command, I have struggled often to conduct good training in spite of many distractions. The result has too often been training to less than the desired standards. I call it "the 40 percent solution."

Factors that have contributed to this present state of affairs include all those that Major Stoll terms "excuses," to one degree or another. To this list should be added the following:

- The conflict between deficiency-driven and event-driven training.
- The absentee leadership problem that results from frequent stripping away of leadership to conduct so-called "multi-echeloned" training.
- The incessant urging of higher commanders that training be conducted in a realistic environment, notwithstanding the myriad of administrative, safety and maneuver damage constraints imposed by regulations and common sense.
- A pace of activities so frenetic that most company commanders struggle vainly to maintain 100 percent accountability of the several millions of dollars worth of equipment for which they are responsible.

In his discussion of training distractors, Major Stoll has exhibited the insensitivity characteristic of many staff officers once removed from the training battlefield. He, and those who share his "There Are No Lousy Training Environments—Just Lousy Company Commanders" philosophy will only serve to perpetuate the sad state of training affairs we are in today.

JAMES F. GEBHARDT
Captain, Armor
CO C, 4 Bn., 69th Armor

Agrees With CSM Gillis

Dear Sir:

Sergeant Major Gillis hit the nails right on their heads in his "Driver's Seat" articles in the September-October and November-December issues of *ARMOR* about first formations and the Specialist/Sergeant controversy. Nowhere else in today's Army are these two problems more acute than in the National Guard.

Few Guardsmen, whether officer, NCO, or enlisted man, seem to appreciate the vital importance of the "first formation." Indeed, at least among New Jersey Guard units, even if the need for the formation is recognized, no one really knows how to properly hold or use one. Many units, while holding a formation first thing in the morning, again at lunch and finally just before dismissal, simply cannot perform the task according to FM22-5. Worse yet, many officers and NCOs see no need to recognize the haphazard formations as training problems and take the necessary corrective steps. Instead, formations are often held according to the "Old Sarge" method; that is, the way the old timers in the unit remember holding them back in the early 1950s—and sometimes memories aren't what they should be, either.

Know how to really screw up a formation? Give the platoon sergeants orders to prepare their platoons for inspection (very few units can make the time to even bother with such inconveniences as inspections in today's Guard). Chances are good to excellent that each platoon will prepare differently. If the individual squad leaders are on their toes, they will delay slightly to see how the headquarters platoon acts, and then they'll mimic them. The same thing happens with "close ranks" after the inspection.

There isn't one single cause for the breakdown of custom, courtesy, and discipline in the Guard today, but certainly a good deal of the blame must lie with the officers and NCOs. Most are either prior-service types, or have attended the State NCO or OCS academies and have been taught how to act as officers or NCOs; how to set the example for their units and how to conduct drill and ceremonies properly. Unfortunately, when they leave the controlled environment of either an active duty assignment or the academy, they seem to leave their military skills behind and fall into the old ways of doing things. With the Guard now making up more than 50 percent of the Active Army's reserve strength we simply cannot allow this to continue.

I know there are many Guardsmen who, if they bother to read this far, will scream that they are being maligned and that the Guard isn't the Regular Army and what's the big deal about whether or not they can hold a formation or drill their troops by the book? They can put steel on target—and that's all that matters!

That's not all that matters, by a jugfull. Being able to hit a target on a range at Ft. Knox, or "Graf," or Ft. Drum is a very far cry from hitting a hull-down T-72 on the battlefield. (I'll get into the "caliber" of National Guard gunnery some other time.)

OK—so what's still so important about drill and ceremonies? It's leadership at the basic

level. If you can't lead your troops through a proper formation, or around a parade ground, you sure as hell can't lead them in combat.

That first formation and inspection are necessary tools for establishing a high set of standards and seeing that they are met.

It is amazing how much proficiency on the parade ground helps a new or potential NCO in leading troops. It's a basic professional building block!

The worst thing we can do is to promote a specialist 4 to sergeant in order to keep him in the unit or reward him for attending drills. Just because a soldier can handle a coax, drop the breechblock in record time, or even be a great gunner and an all-around nice guy does not mean he has the ability to be an NCO or an officer. He must have *demonstrated* leadership ability if he is to sew on that third stripe or pin on that butter bar. A substandard NCO or officer out in front of a squad or platoon, or in the TC's hatch, denigrates the entire unit and the service as a whole.

I can hear those Guardsmen again crying, "But this isn't the Regular Army, it's the National Guard!" (Baron von Steuben must be laughing his Prussian head off!) Maybe so, but I seem to recall that the tape above my left fatigue breast pocket reads US ARMY, not National Guard.

The Guard and Reserve must realize that since they are the prime backup for the active forces in any future conflict, they bear the responsibility for being fully prepared to step in and fulfill that role; and there won't be a 6-month lead time to straighten out our problems and become "combat ready."

It's past time to get back to the basics of soldiering and, at least in the National Guard, decide whether or not to be "Weekend Warriors" or "Parttime professionals."

CHRISTOPHER D. COFFIN
Staff Sergeant, NJANG

What Is ANCOC?

Dear Sir:

Many young NCOs have asked "What is ANCOC" as they travel down the road in their careers. (See "Commander's Hatch," July-August 1981, *ARMOR*.) As the young NCO completes his training in BNCOC he is moving on to the day when DA will select him to attend ANCOC, one of the most important service schools that the Army has to offer.

I would like to offer some observations derived from my experiences as an ANCOC student.

If you have been selected, you must start preparing yourself for 12 weeks of intensive schooling. You must study gunnery, maintenance, tactics, map reading, communications and many other subjects that are common to all tankers. What you are *not* told is that you will take a test to determine if you have the necessary skills to communicate with your fellow soldiers.

Students are tested in reading, listening and English skills. Those who pass the English diagnostic test are excused from some 30 hours of special classes on English. Those who pass, may take elective courses in speedreading, CLEP review, computers, languages, listening skills, etc..

During the ANCOC, you will have to weigh in and take a diagnostic PT test during the first week. (See "Driver's Seat" January-February 1982 *ARMOR*.) Those who do not pass the PT test may get up to four attempts to pass it. Many have said, "I can always pass the PT test," and yet many fail the 4th try on graduation day. Those of you who have not been following the guidance in FM 21-20 had better take another look. You cannot graduate if you fail the PT test.

Mentally, the hardest areas are gunnery, pioneering for tankers and tactics. If you can lay your hands on a new FM 7-12-3 "Tank Gunnery" get it! The Gunnery Division of the Weapons Department will be training only M60A3 or M1 tank gunnery as of January, 1983 (M1 tanker, FM 17-12-1). This instruction covers many subjects such as machine-guns, ammunition, tank gun capabilities, conduct of fire, auxiliary fire controls, advanced conduct of fire, target acquisition, range determination, training devices, conduct of tank ranges and platoon fire control, among others.

Pioneering for tankers covers demolitions, bridge classification and route reconnaissance skills.

Tactics instruction ties all this together. You'll be taught tank platoon tactics for offensive as well as defensive maneuvers. You'll go to the field for about four days during which time you will be evaluated on your leadership abilities. The tactics test is taken on a terrain board and you must be successful in all 20 requirements, including use of CEOI, call for fire, platoon fire commands, map reading, threat vehicle ID and offensive/defensive movement of the platoon (FM 71-1).

There are many other subjects that you will be taught, such as BTMS, NBC, military justice, NCO development and other skills and knowledges required of tankers.

As has been said, this is one of the most important schools that a young NCO can attend. But, some problems in course content, scheduling and methods of instruction need to be corrected.

For example, I have seen poor instructors, wasted time and instruction repetition. The course could be shortened and the time more wisely managed. I would have preferred a more challenging course. Instead, I had the feeling that all I was doing was punching a ticket.

To be an effective tool, the ANCOC must be a school where young, inexperienced NCOs can gain the knowledge and skills necessary to become a platoon sergeant and not simply a place for some soldiers and civilians to earn their living.

STANLEY C. MARTIN
Staff Sergeant
USA NCO/DSS Ft. Knox, KY

Sidi-bou-Zid: A Sergeant's View

Dear Sir:

Almost forty years have passed since those days that Captain William R. Betson uses as the basis for his article in the November-December 1982 *ARMOR* Magazine about the events at Sidi-bou-Zid.

As an eyewitness participant to the actions which Captain Betson describes, perhaps I can contribute a little and correct a couple of minor inaccuracies.

First, my credentials: I was an enlisted man in the old 1st Cavalry Regiment (Mech) and prior to this period, I was trained as a scout, scout squad leader, tank crewman, tank commander and section leader in both light and medium tanks, and platoon sergeant and platoon leader of a mortar platoon. Alternating in the latter two positions, I participated in the first attack on Faid Pass (TF Stark) on 31 January 1943. On 1 February my platoon, along with other elements of 3/1 AR, shifted to support TF Kern's attack near Rabau Pass. This attack was aborted and I received orders to position my platoon to support a French force occupying djebel (hill) Ksiara.

I did a complete reconnaissance of djebel Ksiara and established a good OP from which I could view almost all of Rabau Pass and a considerable area all the way to the eastern approaches to Faid Pass.

Lack of binoculars plagued my platoon (and the tankers of 3/1st AR), seriously inhibiting precise target acquisition and identification.

I spent several days observing and reporting the bits and pieces of information which led me to conclude that a force of near division size was forming for an attack.

I know that both Drake (TF 3/168) and Hightower held this same view and such information had been passed to CCA. In short, we were kept informed.

On 14 February I heard the first sounds of tank gunfire in the vicinity of Lessouda. At the battalion CP, I met Hightower and complained about the inadequacies of a "stovepipe" platoon in tank battles and let him know in no uncertain terms that I wanted to be a tanker again.

To my surprise, he said, "So you want to get back in tanks, do you? Right there" (pointing) "is an I Company tank that has been in maintenance. It is short some crew members. I'm taking it up to rejoin its company. There it is—have at it. Stay on my right on the way up."

During the engagement, I moved further to the east and observed some enemy tanks that appeared to be trying to get behind I Company and recognized them as *Mark Vs*. When they were about 6-700 yards away I opened fire on the center tank of a three-tank formation. My gunner hit with every shot and my loader made that 75-mm sound like it was belt-fed. The enemy tanks were backing up when we took three hits in rapid succession and my tank caught fire and we abandoned it.

I was "out of the traffic pattern" for a while but, later, Captain Frederick B. Magers, my company commander, said that he needed my help in putting together tank crews from the stragglers and battalion HQ to man some M3 *Grant* maintenance float tanks. Within an hour we had formed nine tank crews and I had been given command of a tank platoon.

Upon approaching Kern's Crossroads, I

was met by the scouts from 3/1 AR reconnaissance platoon (Hightower used this platoon to augment communication and control when other means failed). I reported to Hightower, who had been wounded, and I was informed of the situation and of the fate of 2/1AR by Greene and First Lieutenant Gwin. Hightower then explained the probable course of events to come and discussed positions for me to use for delay and defense of Sbeitla.

During the night of 15-16 February we were in a defensive posture with infantry in front of us. During the 16th and 17th, we were part of the force that covered, then delayed and defended Sbeitla. We occupied defensive positions first east of then north of Sbeitla.

Next morning, 17 February, a scout informed me that he had been sent to take me to see Hightower. Hightower was still on a stretcher in the back of a halftrack. I was told to hold my position until 1100 hours; thereafter I was to coordinate my movement with elements of 13 AR and not to become decisively engaged.

When I returned to my unit and was giving instructions to my tank commanders, my gunner interrupted to say that what appeared to be a large enemy tank formation (in line) was approaching Sbeitla from the east. I surveyed the situation using the gunner's telescope sight (no binoculars). I saw a group of from 60 to 80 enemy tanks, or armored vehicles, approaching. The lead element was about 6,000 yards away and was on a course to hit our forces in and south of Sbeitla.

When the nearest tank was about 3,500 yards away I ordered my unit to open fire. My tank was hit and later I had to abandon it.

1100 hours had long passed so I withdrew my unit and passed through the rearmost unit of the 13th AR and took up a position astride the highway at the next good terrain feature. After that, we "leap-frogged" with the 13th AR units through three alternative positions. The next afternoon we organized a provisional tank battalion and I was given command of a medium tank platoon equipped with M4A2 diesel-powered *Shermans*.

I have tried to give an account of the action of troops at the small unit level. I agree with Captain Betson that the blame for failure cannot be laid at the expense of the troops or small units, and I carry this to battalion level.

Now, for a couple minor inaccuracies in Captain Betson's article and then go to his other points.

1. The 3/1st AR (and 2/1st AR) were equipped with M4A1 *Shermans* at the outset of the engagements described.

2. The 3/1st AR lost 44 tanks (not 14) on 14 February.

3. 2/1st AR attack was delayed to 1240 hours 15 February (not 14 February).

Early in his article, Captain Betson states that "the quality of equipment was approximately equal." I must contest this, because I believe that a disparity in quality of tank guns, antitank gun sights and optical aids was the

major contributing factor in our defeat. I don't buy the premise that our artillery and infantry weapons and levels of issue redressed the balance. It flatly did not. How about my binoculars?

I agree that there is a case to be made that there was some weakness at the general and colonel level and that a way to overcome this in the future is to study war, including defeats and, above all, learn the principles. The planners, tacticians, and doers of this battle were Army, and the mistakes were theirs.

Now, we must project ourselves forty years forward. Except for Europe, our forces are most likely to be committed to action under the plans of a unified, or joint, command. You have officers from all the services at these commands, and their plans, or necessity, cover vast distance and they use very large scale maps, (1/over the Continent). Having labored in the environment of such commands, I say that many of their plans reek with the violation of principles. Perhaps one of the most important duty assignments for astute officers who are well-grounded in the knowledge of battle principles would be assignment to such a command.

RAYMOND M. RIGGSBY
Lieutenant Colonel, Armor
U.S. Army (Retired)

(Lieutenant Colonel Riggsby received a battlefield commission for his actions at Sidi-bou-Zid. Ed.)

T-64 Article Questioned

Dear Sir:

I noted with interest the letter from Lieutenant Warford in the latest issue of *ARMOR* magazine concerning the controversial question of the T-64 and T-72 tanks. (See "Letters" January-February 1983 *ARMOR*. Ed.) Lieutenant Warford's contentions are undermined by his seeming lack of familiarity with the development history of the T-64. There may well have been a 115-mm gun tank used as a prototype in the T-64 development program, but when the actual T-64 was first fielded in 1967 with the 41st Guards Tank Division, it was fitted with the current Rapira 3 125-mm gun. These guns were not later retrofitted as Lieutenant Warford seems to imagine. In regard to whether the T-64 suffered from teething problems, I would suggest that Lieutenant Warford read either of Viktor Suvorov's books about his experiences as a tanker in the Soviet Army (Suvorov served in the first T-64 unit), or speak to the emigre Soviet tankers now living in the United States. Lieutenant Warford's speculations might hold more water if they were backed up by a more diligent effort to collect what little unclassified information exists on these elusive tanks.

STEVEN ZALOGA
Greenwich, CT

Armor Conference
Fort Knox, Kentucky

10-11-12 May 1983

Implementing the NCODP within your unit will require keeping your commander fully informed of progress and continually seeking his involvement, advice and assistance. This team effort is crucial to the success of the NCODP.

Implementation

The delegation of authority for the noncommissioned officers to carry out and fulfill their assigned responsibilities in the NCODP must be clearly stated by the commander. Commanders must trust the judgment of the noncommissioned officer, unless that judgment has proven to be faulty. However, noncommissioned officers must realize that they are responsible to the command, while commanders are responsible for the command.

Efforts to enhance noncommissioned officer's prestige through improved professionalism will focus primarily on the junior noncommissioned officers. Senior noncommissioned officers will be tasked with ensuring that junior noncommissioned officers receive the necessary training and guidance and that they are evaluated on their effectiveness in responding to this training and guidance.

Frequent and systematic personal and performance counselling and coaching must be made an integral part of the NCODP. Counselling must praise strength as well as criticize weakness; recognize success as well as identify failure.

Each battalion and/or company must maintain a program for implementing the NCODP best suited to the unit's needs and mission. Unit programs must be in writing and include specific ways of measuring progress. The program can be of company or battalion origin.

Training

Noncommissioned officer training not directly related to MOS skills will be conducted weekly at company, battery, and/or battalion levels and will be separate from any officer/NCO classes scheduled. The objective of this training is to sharpen the noncommissioned officer's skills in leadership and management techniques as well as to keep them informed of the latest changes in regulations, policies and the EPMS. NCO Calls held by unit first sergeants or battalion command sergeants major are an excellent way to accomplish this training. Topics may range from observations of senior noncommissioned officers to critiques of unit exercises to professional subjects derived from Army publications and periodicals. Training that lends itself to evaluation of what the noncommissioned officer has learned will be evaluated and recorded.

The advantages of formal civilian and military education programs cannot be overemphasized, and full advantage must be taken of the available schools. Priority for attendance to PNCOC and PLC must be given to those on the standing promotion list or under consideration for promotion. An order-of-merit list must be maintained for attendance at these schools as well as BNCOC. Battalion command sergeants major should be responsible for the procedure to properly identify soldiers for attendance at these schools. Once identified, they will attend as placed on the order-of-merit list, regardless of other training commitments within the unit.

A civilian educational concept will be included in the NCODP, allowing the noncommissioned officer and soldier to seek a higher education. Civilian education enhances the training capability of the noncommissioned officer. Expectations, however, must be reasonable in terms of training requirements.

Responsibilities

The responsibilities inherent in the NCODP rest on the shoulders of noncommissioned officers from command to unit level and should be delegated as follows:

Command Sergeants Major implement the NCODP in subordinate units as directed by their commanders and advise the commander on the status of the program.

They will assist subordinate command sergeants major in the implementation of the NCODP and will ensure standards of excellence in the program. Additionally, they will inspect and evaluate the NCODP in subordinate units as directed by their commanders and will promote military and civilian education development of noncommissioned officers and soldiers in subordinate units.

First Sergeants should be fully involved in all training to include ensuring the trainers are trained. They must maintain a written NCODP for the unit that will include:

A list of selected subjects in which the noncommissioned officers need training.

A three-month training forecast showing when the selected subjects will be taught.

A standing order-of-merit list for each noncommissioned officer leadership and MOS-type school that has a quota system.

A record of those involved in military correspondence courses, including a procedure for monitoring progress to ensure completion of the course(s).

A procedure to evaluate and record the progress of each noncommissioned officer involved in the NCODP.

First sergeants should be held personally responsible to the unit commander for the professionalism of the noncommissioned officers in the unit. They should advise their commander on the status of the NCODP and of the progress of the noncommissioned officers in his unit. Additionally, first sergeants must continually evaluate the NCODP so that it continues to evolve to meet the professional needs of his noncommissioned officers.

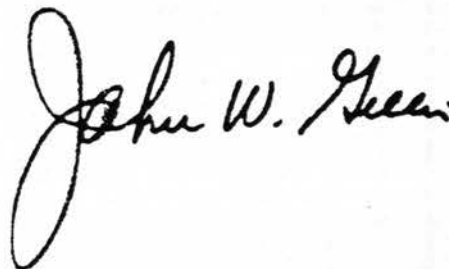
First sergeants hold the most important enlisted leadership positions in the Army. The NCODP will depend upon their interest and enthusiasm for the program.

All noncommissioned officers must understand what their commanders expect of them and they must know the breadth and limitation of their authority. They must maintain their own physical fitness and each of their soldiers' in addition to ensuring individual weapons qualifications for themselves and their soldiers.

Unit noncommissioned officers must be held accountable for the maintenance and availability of their individual equipment and that of their soldiers. They should be responsible for assisting all immediate subordinates in attaining educational goals and must display and demand standards of excellence in the conduct of their training and in that conducted by their subordinates.

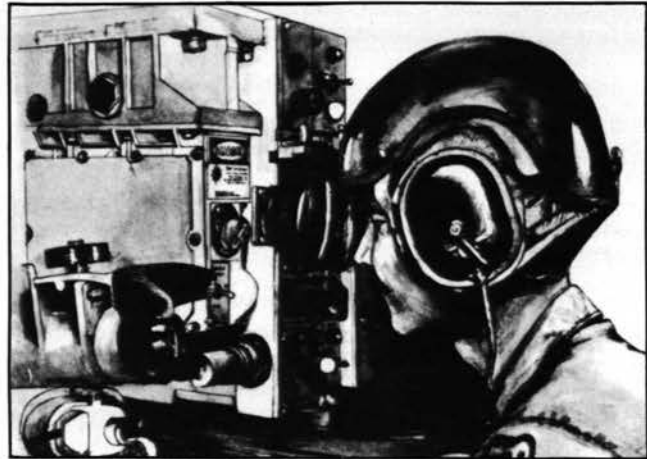
Conclusion

In order to professionally train our soldiers, they must be trained by professionals. The NCODP is individual training in the duties and responsibilities of noncommissioned officers.



MASTER GUNNER'S CORNER

*Captain Jeffrey D. Hawkins
Chief, Advanced Gunnery Training Branch
USAARMS Fort Knox, KY*



Master Gunner's Contact Program

The Weapons Department was reorganized in April 1982. The Master Gunner Branch is now the Advanced Gunnery Branch and is responsible for all Master Gunnery and ANCOC instruction within the Weapons Department.

As early as March 1977, the Advanced Gunnery Branch, Weapons Department, U.S. Army Armor School, instituted a working "Point-of-Contact" program designed to provide a continuous link between Master Gunners in the field and the Armor School. In September 1977, this program was expanded to include liaison with each Army Readiness Region. (See January-February 1978 *ARMOR* for details). This vital link has been maintained informally by Master Gunners and has proven to be an effective method of sharing both information and training techniques.

The development of viable tank gunnery training pro-

grams must incorporate careful consideration of numerous local conditions such as the current training posture, resource availability, and the objectives, both short- and long-term, of these programs. The Advanced Gunnery Branch remains ready to support the Master Gunner in the field as he drives towards the accomplishment of his mission.

Instructors in the Advanced Gunnery Branch are assigned the responsibility for maintaining communication with and providing training assistance to units in the field. Table 1 below outlines the framework of this "Point-of-Contact" system giving the names of both the primary and alternate representative for each Readiness Region and major unit or post. These individuals are your points of contact at the Armor School and can be reached via **Autovon 464-8530** or by writing to **U.S. Armor Center (ATTN: ATZK-WP-AG), Fort Knox, Kentucky 40121.**

Table 1. Points of Contact

USA			Readiness Regions		
Location	Primary	Alternate	Region	Primary	Alternate
Ft. Knox	SFC Huff	SFC Conway	I	SFC Blair	SFC Berthel
Ft. Hood	SFC Pruitt	SFC Blair	II	SFC Conway	SFC Harmon
Ft. Bliss	SFC Pruitt	SFC Blair	III	SSGT Wilson	SFC Strickland
Ft. Riley	SFC Berthel	SFC Huff	IV	SFC Harmon	SFC Pruitt
Ft. Lewis	SFC Perl	SFC Conway	V	SFC Strickland	SFC Perl
Ft. Bragg	SFC Strickland	SFC Perl	VI	SFC Huff	SFC Conway
Ft. Carson	SFC Berthel	SFC Huff	VII	SFC Pruitt	SFC Blair
Ft. Polk	SFC Pruitt	SFC Harmon	VIII	SFC Berthel	SFC Huff
Ft. Benning	SFC Harmon	SFC Berthel	IX	SFC Perl	SSGT Wilson
Ft. Sill	SFC Pruitt	SFC Berthel			
Ft. Stewart	SFC Harmon	SFC Pruitt			
Hawaii	SFC Conway	SFC Perl			
USMC	SSGT Wilson				
Overseas					
Unit	Primary	Alternate	Unit	Primary	Alternate
8th ID	SFC Blair	SFC Berthel	11th ACR	SFC Perl	SFC Strickland
3d AD	SFC Harmon	SFC Conway	Berlin	SFC Huff	SFC Perl
1st AD	SFC Berthel	SFC Pruitt	1st ID (Fwd)	SFC Conway	SFC Harmon
3d ID	SFC Pruitt	SFC Blair	7th ATC	SFC Perl	SFC Huff
2d ACR	SFC Strickland	SFC Perl	2d ID	SFC Blair	SFC Jewell

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)





Americans were once considered to be formidable night fighters. However, since WW I, our willingness to fight at night has faded. Perhaps it was the overwhelming size of modern armies that caused commanders to limit their combat operations after sundown. Perhaps increased mobility was the intimidating factor. Whatever the reason, night fighting skills among our combat leaders have dulled. They need new emphasis. Modern weapon lethality and improved fire control systems demand our renewed interest if we are to win future night operations.

How can we revive the spirit and skill of earlier American night fighters? What must today's leaders know about night operations in order to train their soldiers to be effective at night? To answer these questions, we must look at four essential factors: the modern soldier, the new night vision equipment, night fighting techniques, and the nightly logistic effort.

The Modern Soldier

The individual soldier is the cornerstone of the Army's night fighting effectiveness. However, due to modern lifestyles, most are ill-prepared for their jobs. With few exceptions, the American soldier has lived and worked in an environment with an abundance of artificial light. Because of this, he may lack confidence in his ability to perform effectively in the hours of darkness. Darkness stimulates the imagination of some soldiers to such a degree that the nervous system becomes overburdened. The result is insecurity that may give way to panic in a stressful situation. Gener-

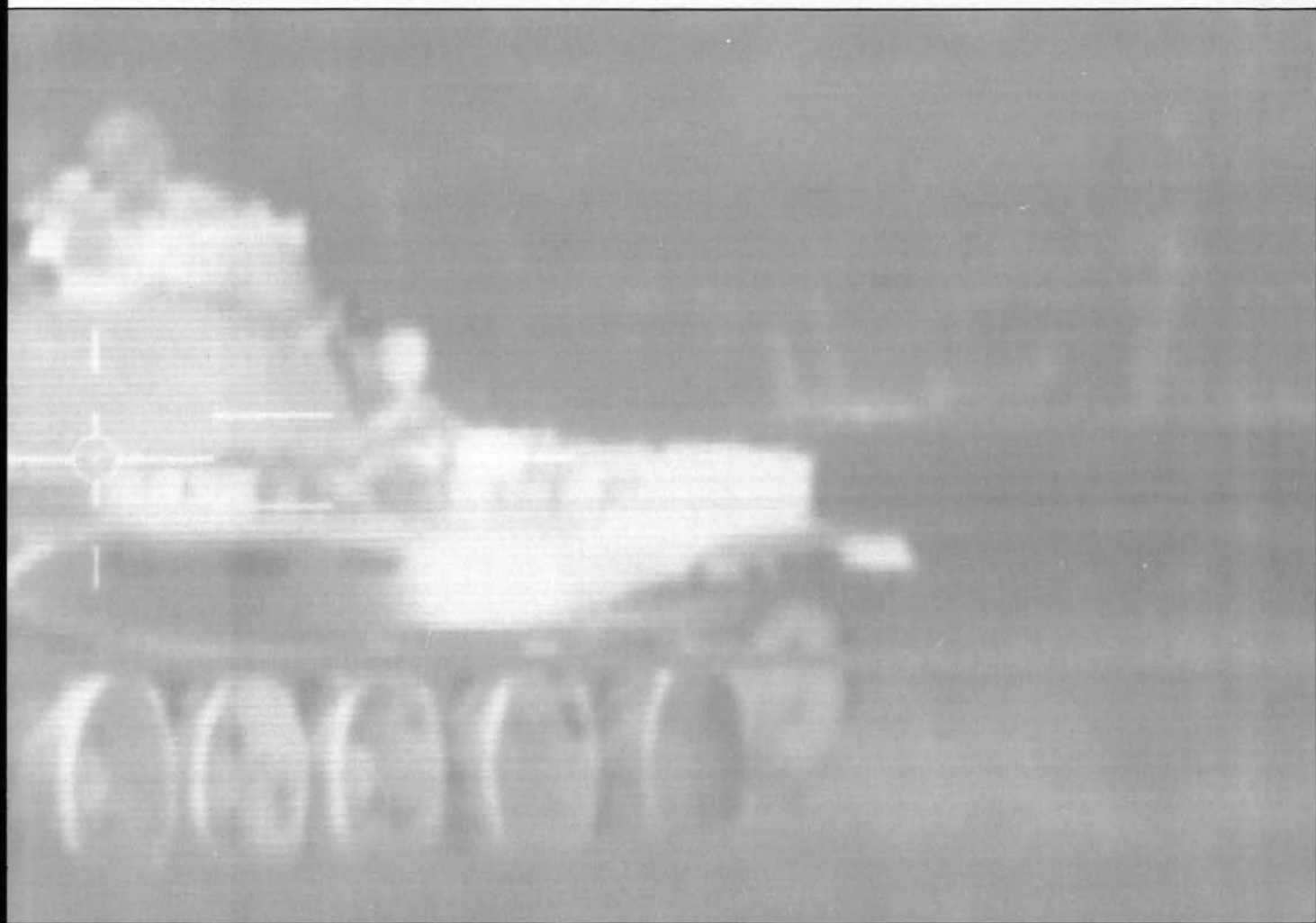
The New N

by Major Jarr

ally, the solution to this problem is improved self-confidence. To achieve this we must first indoctrinate our soldiers. Secondly, we must condition them and, finally, we must refine their fighting skills through realistic training.

Indoctrination. We must instill in each American soldier the belief that he is an unbeatable opponent at night. Basic to this psychology is the contention that in night combat, the soldier will naturally assume one of two character roles. He will see himself as either the *hunter* or *hunted*. The purpose of our instruction should be to imbue his character with the qualities of the hunter. If we are successful, the soldier will imitate, in movement and thought, the aggressive animal that stalks its prey at night.

Conditioning. War is a 24-hour-a-day reality. Normally, half of that period occurs during darkness, and darkness is normally associated with sleep. Leaders, therefore, must be prepared to deal with problems relating to acute loss of sleep. Unfortunately, too many leaders dismiss the cumulative effect of sleep loss. They realize too late that without adequate rest, the body and mind lack an essential ingredient that supports rational judgment, endurance, and courageous performance in combat. One solution to this problem is to



Night Fighter

es Henderson

change the soldier's sleeping habits. In some practical way, the individual should be conditioned to sleep shorter periods. In doing so, however, he must be allowed more than one sleep period in a 24-hour day. For example, an 8-hour on and 4-hour off work/rest cycle over a 12-hour period will afford adequate rest. By following such a schedule, the unit will be able to operate continuously for several weeks. Other work/rest schedules are also acceptable, depending on the type of tasks being performed.

The entire unit cannot sleep at the same time. Work and rest must be arranged so that at least two, and preferably three, crewmen of a tank are awake and working at all times. Because of the necessity to complete the rotation during a 12-hour period, there will be times when one member of the crew will be resting with three working. At other times, there will be two resting and two working. The key is that the same individual should be scheduled to sleep at the same time during every 12-hour period. And, barring combat, the individual should be required to sleep during his time off. This will be a difficult challenge for frontline leaders. Sleep periods will be missed. Sleep periods will be interchanged among crewmen, or dismissed with *macho* apathy. If these

violations persist, the end result will be fatigued troops, reduced performance, low morale, and incidents of hallucination caused by acute sleep loss. (See "Continuous Operations," *ARMOR*, January-February 1982; and "Sleep Loss—A Debt That Must Be Paid," *ARMOR*, January-February 1979. Ed.)

Training. The last measure intended to enhance the soldier's effectiveness in night combat is training; specifically physical training and job training.

Leaders must not forget the need for physical strength in soldiers who will fight at night. Their strength is needed not only to perform normal combat tasks, which may include hand-to-hand fighting, but also to offset the tenseness and uneasiness that all soldiers experience at night. This is due to the undeniable fact that operating in darkness is a stress-producing activity. Senses are on edge. Muscles are alert for the unexpected. Often these expectations are realized when a vehicle inadvertently falls into a depression, or a soldier steps over the edge of a ravine. In both cases, the body receives an unexpected jolt. The vital difference is that a soldier in good physical condition will have a better chance of surviving than a soldier in poor condition.

In addition to physical strain, the soldier must contend with mental tension. While searching for signs of enemy activity, the eyes and ears strain to see and hear everything. Often, that which can be seen is drastically distorted. For example, a shrub may look like an enemy soldier, or *vice versa*. A line of telephone poles may appear to be a line of

advancing troops. A small village may look like a forest. Until he learns to discriminate between sights and sounds that are important and those that are routine, the soldier's good physical condition will act to offset mental fatigue.

Regarding job training, there are many who will testify that weapons often must be loaded and even repaired in total darkness. Expertise with the "tools of the trade" is a must.

Soldiers must also be trained to respect and understand the phenomenon of light and sound transmission at night. For instance, a lighted cigarette can be seen as far as 800 meters. In an area of reduced background noise, the sound of shovels and pickaxes in use may be heard up to 1,000 meters. Other examples of light and sound peculiarities at night are shown in tables 1 and 2. In addition, all must be versed on the "how-to-do-it" techniques written in our tactical standard operating procedures (SOP). Since night operating techniques differ from the day, there should be a special section of the SOP dedicated to the night attack, the night defense, and the night road march. By training to the standard of the tactical SOP, recurring night operations will be accomplished with a minimum of verbal instructions.

Night Vision Equipment

Thermal Systems. Of all the new night vision devices, the thermal sight seems to be the most significant. While of differing designs, the thermal systems found on the M60A3 and M1 Abrams tanks, the M2 and M3 Bradley fighting vehicles, and the improved TOW vehicle generally produce the same result—a video image based on temperature variances of the objects being observed. Crewmen, and especially gunners on the new combat vehicles, think that the thermal sights are the greatest innovation since the introduction of video games.

The primary advantage of this new tool is that it sees the heat produced by objects, rather than the objects themselves.



On the battlefield, objects that are intent on doing us harm usually produce more heat than do rocks, trees, and man-made structures around them. For this reason, the glow of a warm-bodied Soviet soldier and his hot BMP will stand out in our thermal sight in contrast to their colder surroundings. Whereas past night vision devices were defeated by smoke, dust, and rain, the new thermals continue to see the battlefield through the obscurations. The tradeoff is that, as ranges are extended, the ability to achieve a defined image is reduced. To offset this disadvantage, gunners must over-train, to some degree, on the techniques of identification peculiar to thermal systems.

One technique of identification that seems to work well has been built into the system. It is the ability to switch image polarity. When polarity is reversed, the target's outline and hot spots are enhanced.

Well-trained gunners know that a T-62 tank, when seen through thermal sights, will display a definite glow or hot spot over areas corresponding to the vehicle's heat-producing components such as the engine and final drives (figure 1).

Image intensifiers. Other night vision devices that turn night into day include image intensifiers and active infrared (IR) devices. Image intensifiers have been around for several years. First-generation devices were called "Starlight Scopes." They are passive in that they do not project detectable energy. Instead, they amplify the ambient light that exists in the night to project an image inside the scope. These devices intensify moonlight, starshine, and even faint skyglow, up to 40,000 times.

The other category of night vision equipment is active IR. Active IR devices were around in WW II, and are still used on some armored vehicles today; however, their usefulness is limited. The active light source, which is an integral part of the system, is easily detected by other night vision viewers on the battlefield.

Night Fighting Techniques

Most tacticians will agree that at night we still do the same things we did before night vision aids were invented. We still attack, defend, and move from point to point on the battlefield. It's just that today we are able to do these things with more confidence and at somewhat greater speed. Of course, there are others who feel that the new devices are the solution to all our problems. In the final analysis, however, the balanced opinion seems to be that the new night vision aids are a giant step forward, but do not guarantee success. There are no short cuts to the detailed planning and training process that is a prerequisite to successful night operations by large, mobile forces.

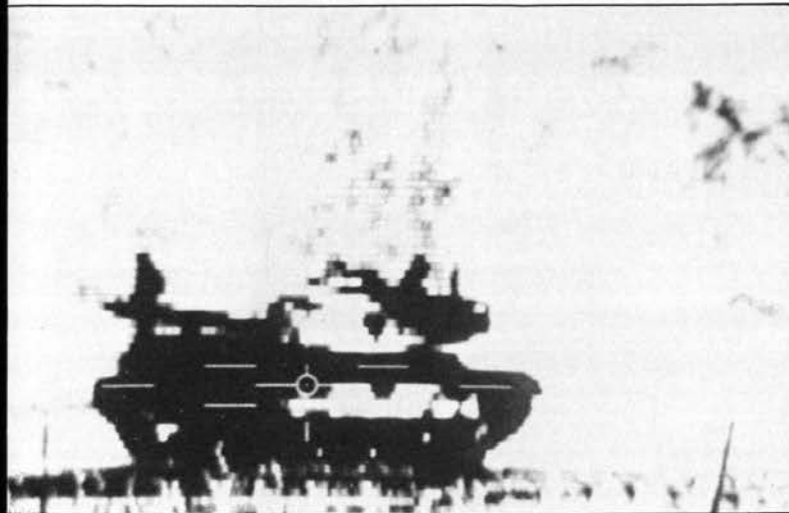
Table 1. Distances at which various light sources can be observed at night with the naked eye

Source	Distance km
Headlights of motor vehicles and tanks	4-8
Muzzle flashes from single cannons	4-5
Muzzle flashes from small arms	1.5-2
Bonfire	6-8
Flashlight	up to 1.5-2
Light match	up to 1.5
Lighted cigarette	.5-.8

Air observation doubles/triples these distances

Table 2. Distance at which sounds are perceptible by man at night in open areas

Sound	Distance
Cannon shot	up to 15 km
Single shot from a rifle	2-3 km
Automatic weapons fire	3-4 km
Tank movement	
—On a dirt road	up to 1.2 km
—On a highway	3-4 km
Motor vehicle movement	
—On a dirt road	up to 500 m
—On a highway	up to 1 km
Movement of troops on foot	
—On a dirt road	up to 300 m
—On a highway	up to 600 m
Small arms loading	up to 500 m
Metal on metal	up to 300 m
Conversation of a few men	up to 300 m
Steps of a single man	up to 40 m
Axe blow, sound of a saw	up to 500 m
Blows of shovels and pickaxes	up to 1,000 m
Screams	up to 1,500 m
Oars on water	up to 2,000 m



To illustrate the veracity of that statement and the applicability of other major discussion points in this article, consider the stories of two American combat units. The first illustration is based on fact. The other is enhanced conjecture. Both involve American combat troops who are about to experience the turbulence of night combat.

19 July 1950. Taejon had been ominously quiet that evening. Occasional showers settled the stifling dust raised by traffic in the city. As the night wore on, the quiet gave way to noises that signalled the movement of a large armored unit.

At his command post, Lieutenant Colonel Harold B. Ayres, commander, 1st Battalion, 34th Infantry, heard the movement of tanks on his right. He strained his eyes to see through the darkness but without moonlight his effort was useless. The radio was silent, yet he knew that something was going on. Why were there no reports? At 2200 hours he sent a patrol from headquarters company to investigate. They never reported back.

At 0300 hours, another patrol drove cautiously down the same road to reconnoiter the situation. Enemy fire stopped them at a roadblock. The patrol members reported seeing bodies of several men of the earlier patrol and their destroyed jeeps. It was clear from these incidents that enemy units were moving around the battalion's positions under cover of darkness to the rear of Taejon.

Shortly thereafter, the enemy attacked in strength. Infantry and armor came down both sides of the highway that bisected the 1st Battalion's position. Other enemy infantry attacked the north flank. Confusion and panic was rampant as smoke and dust filled the darkness. The North Koreans penetrated to the mortar positions behind the rifle companies and then struck headquarters company. At about 0400 hours, small arms fire hit the Korean house in which the 1st battalion command post was located and riflemen from overrun positions began streaming into the headquarters company area. Lieutenant Colonel Ayres tried, but failed, to communicate with his front line companies. He sent a messenger to the regimental headquarters with word that tanks had penetrated his position and were headed toward the city. In the rapidly-spreading confusion, Ayres decided to evacuate the command post. Major Leland R. Dunham, the battalion executive officer, led about 200 men from the heavy mortar company, the heavy weapons company, and the battalion headquarters southward from the Yudung valley and away from the sound of enemy fire. Lieutenant Colonel Ayres and his

S3, followed. The rifle companies, for the most part, had already scattered into the mountains. The time was 0520 hours. Day was dawning.

So what does this story teach us? Was the military philosopher correct when he stated that our best tactics and plans are abandoned when the first shot is fired? I think not. A better assessment would be that when the first shot is fired in darkness, tactics and night control measures are severely tested. Actions are automatic and are based on training. Command and control is only as good as the detailed instructions issued prior to engagement. Consider the next example:

19 January 1988. The position chosen by the team commander was slightly higher and approximately 2,000 meters southeast of his team's objective. From his vantage point he could see evidence of the enemy's presence on a series of camel hump hills that were dotted with vegetation. As he observed the area, the commander's chief concern was the probable location of enemy ATGM's. He also searched for areas where enemy pre-planned fires and obstacles would likely be located. Based on intelligence estimates, the enemy force was a mixture of armor and infantry elements, prepared to defend the key terrain on which they were located.

Meanwhile, back in the assembly area, crews were going through precombat preparation. The platoon sergeants were in charge and they knew exactly what to do. Tanks and carriers were being topped off with fuel and ammunition. Night vision sights were mounted, tested, and boresighted. Extra batteries for the night vision devices were distributed along with pyrotechnic ammunition. With equal energy, the tank commanders and squad leaders secured the thermal reduction camouflage screens that disguised the visual outline of their vehicles. Mud was used to cover shiny surfaces. External lights were disconnected as were all but the most essential internal lights. Required instrument lights were dimmed because of the dangerous amount of light they emit through periscopes and vision blocks.

Personal camouflage also received much attention due to the dangerous thermal signature produced by exposed skin.

After the team operation order had been given and reconnaissance by all leaders and scouts had been completed, the team waited for darkness. Sleeping schedules were enforced; however, no one slept soundly. At dusk, and again after sundown, the platoon sergeants, selected tank commanders, and squad leaders moved forward to look at the objective and its surrounding terrain by moonlight.

They were looking for the control points on the ground that would be used to control the night attack. Once they were satisfied, the group started on the return trip, all the while moving with stealth and caution, trying to remain concealed from the enemy's thermal viewers.

Following the commander's timetable of actions, the team went on full alert at 0200 hours. Since midnight, supporting mortars from the battalion mortar platoon had deliberately fired beyond the objective to give the appearance of a reconnaissance-by-fire mission. In reality, the sound of mortar explosions would cover the track and engine noise of the team as it moved toward the objective. The first element crossed the line of departure at 0230 hours.

Across the front of the division main attack, other teams were performing identical missions. The question was, who would be detected first, and thus alert the enemy that he was being attacked in a concentrated area? The time was 0250, and a light drizzle began.

Earlier, dismounted scouts from the battalion had gone forward to locate weaknesses in the enemy obstacle system. With grappling hooks and ropes they had already removed some of the barbed wire to form passage lanes. To everyone's surprise, the wire had not been backed by booby trap mines or flares that would have alerted the enemy to the tampering. An enemy observer, however, must have heard the sound of movement because, within minutes, the sky filled with flares and a searchlight from a flank position illuminated the obstacle line.

Not wanting to reveal their location, the breaching force for the team held their fire. They were still in a covered position 600 meters short of the objective. Rear elements of the breaching force continued to place chemical light sticks along the direction of attack to serve as directional guides for the remainder of the team. The sticks were placed in cutaway cans that directed the greenish light toward friendly forces and away from the enemy.

Back on the objective, the scouts called for smoke on the far side of the obstacle. Simultaneously, the team commander called for indirect fire on the objective. Viewing through his thermal range finder, the FIST responded and adjusted fire accordingly. Within seconds, the enemy also called for artillery fire on preplanned targets in front of his obstacle line. The scouts threw their last hooks and ropes across the wire and tied the ends to a *Bradley* fighting vehicle that had moved forward to retrieve them. When the *Bradley* took off, dirt, wire and small bushes followed, causing random explosions within the obstacle system. However, before reaching a covered position, the *Bradley* was flipped and demolished by incoming artillery. Since no other targets were presented on the field, the enemy's direct fire weapons remained silent, another unlucky break for the attacker.

Feeling that he still had some element of surprise, the commander signaled the support force to begin direct fire suppression of suspected enemy firing positions. In accordance with the event-oriented operation order, this signaled the breaching force to commence their assault breach.

With two mine-breaching line charges in tow, and mine rollers mounted on the front of two *M1* tanks, the breaching force moved forward. Once in place, and detonated, the line charges widened the lane previously cleared of wire by the battalion scouts. The mine rollers immediately moved through the system, followed by the two remaining tanks, that continued to fire on the move on suspected positions on the objective. Once through the minefield, the tanks deployed to the best of their ability; however, the platoon leader and his wingman were simultaneously hit by direct fire.

Immediately behind the breaching force came the assault force, which consisted of a mechanized infantry platoon in *M2* fighting vehicles. They passed through the cleared lanes, following the line of chemical light sticks, and began a final, mounted assault. By this time, the enemy had exposed most of his positions and his strength. The support force overwatching the attack, had obligingly eliminated two ATGMs and two tanks by firing at the source of their tracers. Now it was time for the assault force to clean up.

As friendly direct and indirect fire was shifted, the mechanized infantry moved up and into the objective, their firing ports spewing white and red tracers forward and to the flanks. Their aim was not deliberate, but their effect was unquestionably hair-raising. Through



thermal sights, the crews of the *Bradleys* saw scores of infantry and at least two tanks preparing to withdraw. The same sight was seen by the tank crews of the breaching force. Both enemy tanks were engaged with deadly accuracy and destroyed. Some of the enemy infantry were successfully evacuated by their carriers located in reserve positions.

By the commander's estimate, the team had successfully attacked a platoon-size defensive position, killing approximately 23 enemy soldiers and destroying 4 combat vehicles. The remainder of the enemy force scattered into the mountains. The time was 0520 hours. Day was dawning.

As the examples illustrate, night combat is as confusing as it is stimulating. Combat events are unpredictable, yet they must be met by our best estimates and matched by simple control measures. Also, we must not rely too heavily on our new night vision devices.

Night Logistics

Up to this point, we have concerned ourselves with the night *fighter*. Equal attention must be given to the night *logistician*. He is just as critical to the unit's success, and he faces equal difficulties as he moves about the battlefield in darkness while providing the necessary combat service support. The CSS functions most affected by darkness are maintenance and supply.

Maintenance. Basic to the maintenance support plan should be the premise that the night's routine work activity will be anticipated and assigned to mechanics at least 3 hours before sundown; a difficult but not impossible challenge for the experienced motor officer.

The handling and issue of bulky repair parts should also be completed before dark. Once these prerequisites have been met, the maintenance manager should position vehicles and equipment to be repaired in light-proof or light-suppressing shelters. Permanent structures such as gymnasiums, meeting halls, or civilian garages, if available, are recommended. If such structures are not available, mechanics can repair small components, on or off the vehicle, under a lean-to or some other make-shift shelter constructed of tarpaulins or ponchos. The chemical light stick provides adequate light for most detailed repairs under these conditions.

To prevent congestion and confusion, a staging area must be designated for vehicles awaiting repairs. When possible, tow cables or tow bars remain attached to vehicles that cannot move under their own power. If not needed elsewhere, a prime mover such as a personnel carrier, or recovery vehicle, remains attached to the deadlined vehicle to facilitate movement into the maintenance shelter or for emergency



evacuation. The latter contingency is especially critical, given the likelihood of a night evacuation of the trains or unserviceable equipment rally point (UERP) activity.

Forward of the battalion field trains, repairmen are equipped with the AN/PVS-5 night vision goggles, which add an additional 2 pounds of weight on the head, but permit free hand movement. Using the attached IR light source, repairmen can read necessary technical manuals and accomplish most repairs requiring detailed viewing. Also, to ease their work during darkness, mechanics are night trained for specific items of equipment and then routinely assigned to those pieces of equipment during darkness. To avoid the inevitable fumbling for lost wrenches, mechanics mark their tools with luminous tape.

Supply. While all classes of supply are affected by night combat, Classes III and V present the most significant problems.

Class III—Petroleum, oils, lubricants (POL). Consumption of POL increases during sustained night operations. Generators operating continuously require more fuel and oil, as do idling vehicle engines. Vehicles operate in lower gear ratios, which increases POL consumption. Spillage is usually greater because of reduced visibility. Consequently, the night logistician plans for this increased consumption, and does whatever is necessary to make the fuel handler's job easier. For example, distribution of bulk fuel involves the operating of dispensing equipment; therefore, control valves and containers are identified according to their respective products; i.e., gasoline, diesel, grease, or engine oil. Forward area fuel handlers are equipped with night vision goggles to reduce spillage and as an aid in cross-country navigation.

Class V—Ammunition. Improved night vision devices have done much to equalize day and night capabilities of weapons and related ammunition consumption rates. Because of this, ammunition-required supply rates may be greater than forecasts based on previous night statistics.

Night operations may also result in increased requirements for barrier munitions such as mines, pyrotechnics, or countermine line charges. Sometimes it is advisable to pre-stock limited amounts of ammunition, especially in the defense. At night, these stocks are more vulnerable to infiltrators and must be guarded by infantry with night vision goggles and sights. These devices are also helpful to crewmen and ammunition handlers who must transfer bulky ammunition from trucks to tanks.

Miscellaneous. Other items of supply vary in demand depending upon weather, terrain, and the type of operation under consideration. However, for most tactical operations at night, the logistician must forecast the increased demand for:

- Engineer tape and stakes
- Tarpaulin shelters
- Night vision device batteries
- Night vision device float supply
- Flashlights, lenses, bulbs and batteries
- Luminous tape and paint
- Chemical light sticks
- Red lensed goggles
- Pure tracer subcaliber ammunition belts

Logistic packages (LOGPAC). One of the most innovative resupply techniques to be implemented in recent years is the LOGPAC. The survivability of the LOGPAC is increased many times over when the convoy moves at night.

The idea behind the LOGPAC is a simple one. Instead of moving ammunition trucks, POL trucks, and other supply vehicles forward on an individual basis, the services are combined into a single package, the LOGPAC.

This convoy of supply vehicles is led by a vehicle with night vision capability to a battalion logistic release point.

At that point, the company first sergeant meets his resupply package then guides them to the company's forward positions to conduct resupply. At night, the first sergeant may want to reduce the movement of his combat vehicles by guiding the ammunition and fuel trucks directly to each fighting vehicle's position. This technique is good, but has some drawbacks such as the unacceptable noise generated by many of our fuel-dispensing units, or the noise of ammunition being transferred from trucks to tanks. An alternative method is to have the combat vehicles return, one or two at a time, to a service station operation 100-200 meters behind the fighting positions. If the service station can be located in a depression or behind an embankment, the noises created by the operation will be partially deflected.

After completing the resupply, the unit first sergeant returns the CSS vehicles to the release point, where the battalion support platoon assumes responsibility for their return to the battalion trains. The following evening, the same process is repeated.

Conclusion

Over the years, as forces became larger and more mobile, the difficulties inherent in night operations have multiplied. Perhaps that is the reason why the Army tended away from night operations on a large scale in the years following WW I. Unfortunately, the most significant casualty of that trend was the spirit and skill of the American night fighter.

In recent years our attitude toward night operations has changed. Now, night combat is viewed as a tactical necessity. To meet this challenge, we must begin relearning those skills that make units successful at night so that when the sun goes down on future battlefields, fear of the American night fighter will once again consume the hearts of the enemy.

MAJOR JAMES HENDERSON was commissioned in armor from Texas Technological University, Lubbock, Texas in 1969. He has served as mortar platoon commander, tank company CO, tank gunnery assistance team OIC, Battalion S1, S4, HHC Commander, Bn XO and is currently assigned to the Command Staff and Doctrine Department, USAARMS, Fort Knox, Kentucky.





Armor Technology (Part III)

by Joseph E. Backhofen, Jr.

This is the tenth in a series of articles on tanks and the technologies of armor penetration, armor, and survivability.

The famous German ballisticians, C. Cranz, has noted that "If the velocity of the bullet is very great, the compression causes the sectional area of the bullet to be considerably increased. The effect of the change πR^2 is more important than that due to a $+bv^2$; . . ." ³¹ The longrod penetrators used in armor-piercing, fin-stabilized, discarding-sabot (APFSDS) ammunition are already well known for the deformation they undergo while they pierce armor materials and arrays. ^{28, 53-57} Thus, it is obvious that hard-surfaced materials should be used to squash their noses and tough materials should be used to absorb their energy. The effectiveness of a single material of high surface hardness with high toughness to provide this effect of projectile nose squashing and energy absorption was responsible for the empirically derived ship armor trends for protection against hardened, armor-piercing shells from the previously discussed laminated (compound) armor to Krupp cemented armor. ⁴⁹ The major improvement was that:

"It was a Chrome-Nickel-Steel alloy of enormous toughness which was 'face hardened'. The face hardening process creates a material of three distinct layers: (1) The Cemented (highly carburized or 'case-hardened') outer layer about 1 inch thick, which was the hardest portion of the plate (Brinell 600 or thereabouts); (2) the 'Decrementally-hardened' face of about 30-40 percent of the plate's total thickness, whose hardness dropped off in a kind of 'ski-slope' from about Brinell 550 to about Brinell 225-275, which made up the rest of the plate and soaked up the impact shock to keep the brittle face layers from shattering under impact like glass". ⁴⁹

While a penetrator pushes its way through armor, it moves aside the armor material(s), expanding a cavity that becomes the well known penetrator crater. If the penetrator overmatches the armor, it also "blows out" a cloud of "spall debris" from the back surface. These can be modeled by spherical or cylindrical cavity expansion theories that consider the work required to rapidly deform the target mate-

rial. ⁵⁸ Soviet ballisticians have referred to these analyses as being based on the "hypothesis of flat sections," wherein each theoretical layer of material is pushed exactly to the side of the penetrator in order to form the crater. ⁵⁹ The methods have even been applied to the penetration of soils and rocks, as well as underground explosions. ⁵⁹ The Soviet ballisticians, A. Ya. Sagomonyan, has also noted specifically the effects of penetrator nose shape on deformation and that the hypothesized thin layers could actually be layers of different material such as used in a laminate array. ^{59, 60}

The importance of the ductility of the last structural layer of a composite or laminate array (or the back of a solid armor) cannot be understated, as it must maintain the structural integrity of the armor and vehicle. ^{25, 26} This layer must of necessity be capable of resisting penetration, if the penetrator reaches it, as well as capable of absorbing the kinetic energy (momentum) of the impact into the armor or array. ^{10, 26, 61, 62} However, this will more likely than not be over-matched at some point during the life of the armored vehicle. It is most important then that this final structural layer not contribute to the behind-armor debris or "spall" at this time, as well as remain structurally sound.

If an armor array is overmatched by a charge or projectile that batters it or pierces it, then it becomes important to protect the occupants of the vehicle from the behind-armor debris. An ancient way of accomplishing this was to hang curtains behind and away from the wall of fortifications. ^{63, 64} The effectiveness of such shields can be as great as that described by Lt. A. D. Wharton of the Confederate ship *Tennessee* after having been hit by a 15-in. shot from the Union monitor *Manhattan*. ⁹ "The *Monogahela* was hardly clear of us when a hideous looking monster came creeping up on our port side, whose slowly revolving turret revealed the cavernous depths of a mammoth gun. 'Stand clear of the port side,' I shouted (and), a moment after, a thunderous report shook us all, while a blast of dense, sulphurous smoke covered our portholes, and 400-pounds of iron, impelled by 60 pounds of powder, admitted daylight through our sides, where, before it struck us, there had been over 2 feet of solid wood, covered with 5 inches of solid iron. This was the only 15-inch shot that hit us fair. It did not come through; *the inside netting*

caught the splinters, and there were no casualties from it."

Thus, although the armor array was severely perforated, the netting (spall curtains) caught the behind-armor debris that could have caused serious injury to the crew. Recent research by the US Army Materials and Mechanics Research Center has proved the value of similar liners of modern materials, such as Kevlar, in armored personnel carriers.⁶⁵ Thus, they are greatly recommended, and have previously been noted to have been used in Soviet vehicles such as the T-55 and T-72 main battle tanks. A similar service of protection from bolts and armor splinters was performed by 9-mm duco steel plates that were installed 700-mm underneath the armored decks of the Japanese battleship *Yamato*.⁶⁶ Needless to say, spall curtains can be over-matched just like an armor array. Still, they might canalize the penetrator and debris to protect the crew of an armored vehicle.

The "fairness" of a projectile hit has historically been associated with striking an armor square-on as it has long been recognized that an oblique impact is not as efficient in penetrating armor. However, the use of armor obliquity to defeat kinetic-energy penetrators also brings out some differences in armor design philosophy between various countries. For example, the degree of perforation, whether complete or partial, wherein the penetrator broke through the armor but did not itself exit, is a small point of variance beside the overall methods of evaluation which can be explained by the following.^{29, 53}

- Ballistic limit velocity (U.S.) attempts to find that velocity at which 50 percent of the projectiles striking the specific array will be defeated.

- Critical velocity (U.K.) attempts to define the velocity at which perforation with negligible residual penetrator velocity occurs.

- Critical angle (Germany, U.S.S.R.) attempts to find the obliquity angle at which the armor material will defeat the penetrator at a specific impact velocity.

The U.S. and U.K. methods attempt to relate the range-related impact velocity at which the armor array defeats the penetrator or the penetrator defeats the armor array. In other words, it is concerned with how close a vehicle's armor array can be brought to an enemy's gun before holes get poked through it. Conversely, the method tells how far away a specific gun and kinetic-energy penetrator can be fired at an enemy and still poke holes through the enemy's armor array. This was a major concern for the conduct of naval battles on the open seas.

The critical angle method is concerned with the use of armor obliquity to protect against a specific fielded threat that might be encountered at a specific range at the lowest armor weight. Any additional "compound" obliquity obtained by engagement at an angle from the sides of the obliquity rotation plan can be considered by the armored vehicle designer to provide additional protection. This method of armor evaluation is most applicable to weight-efficient protection from point-blank attacks, such as those that occur when APFSDS (sabot) ammunition is used by tanks. It should be noted, however, that shaped charges always present a point-blank attack, as the penetrating jet is formed at the target when the warhead detonates.

As previously noted in *ARMOR*, the metal jet from a shaped charge warhead generally exerts a high enough pressure that its penetration can be described by a fluid dynamic analysis to yield the following equation for "hydrodynamic" penetration:

$$P = L \rho_j / \rho_t$$

where P and L are the depth of penetration and jet length, respectively, expressed in the same units of measure (mm), and ρ_j and ρ_t are the density of the jet and target, respec-

tively, expressed in the same units (grams/cc).³² The penetration is also little affected by the obliquity of the impact unless the geometry causes the warhead sides to be close to the armor or some other materiel.³² In this case, the result is an imperfectly formed jet rather than material resistance to penetration.

The effect of target hardness of shaped-charge jet penetration has been analyzed by a number of researchers to the formulation of the following principal observations:⁶⁷

- Increased target hardness decreases the rate of penetration by the jet, until

- At a specific "cutoff" velocity the pressure exerted by the jet is no longer sufficient to continue penetration.

Since the shaped charge jet penetrates in a manner similar to that hypothesized for kinetic energy penetrators as just pushing the armor material to the sides, then its penetration through an elastically-plastically deforming laminate target can be analyzed by means of looking at the behavior of each layer sequentially.^{12, 68} Under the assumptions of the hydrodynamic equation, lower density armor materials should provide less penetration resistance (protection) resulting in deeper craters. Thus, one would anticipate penetrations into aluminum and plastic armors to be about 1.7 and 2.5 times deeper than into steel armors, respectively. However, even if this were the case, it should be noted that the weight of an armor goes up with the cube of its dimensions. Thus, if the protected area remains the same, and only the depth of penetration increases, then the lower density material can still provide a significant weight savings over steel armor. Some additional advantages might also be obtained by the stiffness of the bulk material if it is easily welded into hull forms such as has been found with the use of aluminum for the construction of armored personnel carriers.^{69, 70}

The British and Soviets acknowledged the effectiveness of high hardness armor materials in resisting shaped charge jet penetration during the 1950s.⁷¹ The early data showed the effect of various hardness steels and aluminums. Later, Dr. Trinks provided data on the significant weight savings of

Footnotes (continued from Parts I & II)

⁵⁴G. S. Pearson, "Whither Ballistics," in *Proceedings of the Sixth International Symposium on Ballistics*, Orlando, Florida, October 27-29, 1981, American Defense Preparedness Assoc., Washington, D.C. pp 5-14.

⁵⁵M. Van Thiel and L. Edwards, "Target Response To High Velocity Penetration," *ibid*, pp 346-353.

⁵⁶W. J. Bruchey, et al., "Performance of Conventional and High-technology Materials as Long-rod Penetrators," *ibid*, pp 379-387.

⁵⁷P. I. Ulyakov, "Analytic Derivation of the Depth to Which a Fast Thin Rod Penetrates into a Half-Space," *Zhurnal Tekh. Fiz.* 51, January 1981, pp 157-163.

⁵⁸J. E. Backofen, Jr., "Armor/Armor Penetration: Land, Sea, Air, and Space," in *Proceedings of the Fifth International Symposium on Ballistics*, 16-18 April, 1980, Toulouse, France.

⁵⁹A. Ya. Sagomonyan, *Penetration of Solids into Compressed Continuous Media*, Moscow University, Moscow, 1974.

⁶⁰A. Ya. Sagomonyan, "The Piercing of a Plate by a Thin Solid Projectile," *Vestnik Moskovskogo Universiteta-Matematika, Mekhanika*, Vol. 30, No. 5, September-October 1975, pp 104-111.

⁶¹G. Honica and H. Steinhilber, "Energy Transfer by Projectile Impact of Armor," *Proceedings of the Sixth International Symposium on Ballistics*, 27-29 October 1981, Orlando, Florida, pp 363-368.

⁶²Yu. N. Lokhov, et al., "Dynamic Bending of a Plate in Impulsive Mechanical Loading," *Problemy Prochnosti*, No. 3, March 1981 pp 32-37.

⁶³I. V. Hogg, *Fortress: A History of Military Defense*, St. Martin's Press, Inc., New York, 1977.

⁶⁴T. N. Dupuy, *The Evolution of Weapons and Warfare*, The Bobbs-Merrill Company, Inc., New York, 1980.

⁶⁵"Ballistic Liners Improve M113 Survivability Rate," *Army Research, Development, and Acquisition*, July-August 1980, p 7.

⁶⁶K. Matsumoto and M. Chihaya, "Design and Construction of the *Yamato* and *Musashi*," *U.S. Naval Institute Proceedings*, October 1953, pp 1103-1113.

⁶⁷J. E. Backofen, et al., *The Rate of Target Penetration by Shaped Charges at Short Standoff*, Battelle, Columbus Laboratories, Columbus, Ohio, 1981 (available from Defense Technical Information Center, ADB057 447).

40 percent for high hardness steels and 65 percent for aluminum oxide aluminum steel laminates.⁷² These results, and other claims, have led to controversy for over a decade over the arrangement and performance of laminated composite (compound or combined) armors for use as protection from shaped charges.^{2-7, 72-79} One writer was led to explain that British tank designers had developed the material that became known as Chobham armor in the late 1960's and released the information of its development in June 1976.⁷³ One may now suspect in 1982 that the release of information on the advanced armor material that would protect tanks from all known shaped charges might have been to prove that the death of the tank in the face of antitank guided missiles might have been prematurely announced after the October 1973 War. The effectiveness of spaced and laminated armors for the defeat of shaped charges had already been presented in popular publications.^{71, 82, 83} Similarly, spaced and laminated plastic-filled armors had been developed for protection from shaped charges before and during WW II.^{32, 51, 84} Still, the recent vogue is to continue the controversies over the effectiveness of and intent to use various laminate armors containing high-hardness materials and/or plastics in the popular press.^{49, 71-82, 85-87} And, this occurs while existing tanks, such as the *Leopard I* and *Centurion*, have been uparmored with plastic-backed steel plates forming arrays similar to the laminated arrays being discussed.⁸⁸⁻⁹⁰

The compressibility of lower density materials, such as plastics and liquids, when subjected to supersonic penetration by shaped-charge jets has been suggested as a possible reason for their high resistance to such penetration.^{12, 91} However, experimental evidence disagrees with the theoretical research and implies that many low-density materials

resist penetration by shaped-charge jets more effectively than the hydrodynamic formula and material compressibility would suggest.⁹² This means that effective materials such as water and diesel fuel might find very useful positions within tank compound armor arrays^{7, 36, 93} in the same way food, water, supplies, and fuel were used in naval vessels well before WW II.^{8, 48, 49, 66} Thus, the importance of materials to resist shaped charges in the future may depend more on how they are integrated into the overall design of an armored vehicle than they have in past and in a way similar to the naval usage of structure, armor, and material to protect against damage by kinetic-energy penetrators.

The importance of utilizing all the armored vehicle's structure and material as protection has recently been recognized by some tank designers.^{93, 94} They realize that all materials of a weapons platform must offer ballistic resistance to the threats of shock loading and penetration. Armor materials technology must be used to construct the hardest, toughest, fabricable, cost-effective material for the combined roles of structural applications and armor-like resistance capability. Deliberate armor protection by means of mass, high-cost, specifically tailored armor material properties, etc. should further be reserved for application around critical components of the armored vehicle (i.e., men, communication equipment, life support systems, etc.). The latter is an application in the form and requirement of armor materials of the military principal of mass (concentration) at a key objective in battle (subsystem/system survival).

This article has continued the examination of vehicle armor by reviewing the technologies behind the development of armor materials. The discussion will conclude with a review of the past usage of armor materials in armored vehicle arrays and a projection of how they might be used in the future.

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⁶⁹G. W. Budd, editor, *The Military Uses of Aluminum*, 1973 edition, Alcan Booth Sheet Ltd., Birmingham, England.

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⁷⁴J. L. Sorin, "Les Nouveaux Matériaux de Blindage," *Revue de Defense Nationale*, Vol. 25, December 1969.

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⁷⁶R. M. Ogorkiewicz, "Composite Armour," *Composites*, April 1976, pp 71-72.

⁷⁷R. M. Ogorkiewicz, "Latest Trends in Tank Technology," *ARMOR*, May-June 1976, pp 39-44.

⁷⁸V. Kovalev, "Problems of Tank Protection," *Tekhnika i Vooruzheniye*, No. 1, 1977, pp 14-17.

⁷⁹"Wohin tendiert die Entwicklung im Panzerbau?," *Militartechnik*, No. 4, 1979, pp 207-209.

⁸⁰K. Schnell, "Equipment of the West German Armed Forces in the 1980's and Early 90's," *Wehrtechnik*, No. 7, 1979, pp 15-26.

⁸¹B. Fritz, "The AC300 Jupiter, Luchaire's New Antitank Weapon," *International Defense Review*, No. 1, 1982, pp 71-74.

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JOSEPH E. BACKOFEN, JR.

was commissioned in the Corps of Engineers upon graduation from the Polytechnic Institute of Brooklyn in 1966. While with the 62d Engineer Battalion, his service included Rome Plow Land Clearing Operations in Cambodia and Vietnam. Mr. Backofen is currently involved with the development of advanced weapons technology at Battelle Columbus Laboratories.



Soviet Heavy Tanks

by Joseph R. Burniece
and Paul A. Hoven



The discussion presented here is not a description of a well-recognized and studied vehicle; neither is it a discussion of a "super tank." It is, rather, a discussion of hypothetical armored vehicle developments of the Red Army based upon recent rumor and limited knowledge of the current Soviet tank design program. As such, the authors wish to remind the readers that the following discussion often does not agree with many western armor experts nor does it reflect current US Army opinion. J.R.B. P.A.H.

Previously, we discussed¹ recent advances in Soviet main battle tank (MBT) design, identified apparent similarities of the two contenders—the T-72 and the T-64—and emphasized the dissimilarities. We concluded with the hypothesis that the latter vehicle, though less well understood by current deployment, was nevertheless the more important development. Now, we will again attempt to consider the purpose, design, and development of the T-64 as leading to something more than another version of a standard Soviet medium tank. We will consider the development of the T-85—heavy tank. (T-85 is the authors' hypothetical T-series designator based upon Soviet design-program history, and is not to be considered the valid designator for any actual future Soviet tank, nor is it to be considered an official or unofficial U.S. Army designator.)

The Western Threat to Soviet Armor

During the late 1950's and early 1960's the major arms producing countries were all engaged in designing new main battle tanks.² A number of heavy tanks were produced in the *Conqueror* and *M-103* designs. Though they were unsuccessful, due to the size and weight required to meet then minimum standards in western armies, the *Conqueror* did cause the Soviets to recognize the distinct possibility that they might

again face a "heavy" tank in a future war. This was borne out by the Soviets' retention of the T-10M long after the western heavies had exited the field.²

During the later WW II years and continuing to the present, both Soviet and western tank development programs have been seesaw affairs with first one side, then the other, fielding a technically-superior product. It would seem, however, that the western nations were faced with more severe funding problems than were the Soviets. It is a fact that a number of western tank development programs have been forced into oblivion because of funding restrictions.

Outcome of Western 1960's Design Programs

The American/West German codevelopment program fell on hard times in the face of Congressional budget cuts and a certain lack of cooperation between the two nations.

As for the French *AMX-30* program and West German *Leopard I*, we would expect the Soviet tank authorities to have said that they could be adequately countered by the continued development of the T-34 series. Therefore, we would also assume that the Soviets believed that if the T-55 was slightly redesigned and armed with a hypervelocity smooth-bore cannon, the result would be an acceptable design that would meet the Soviet tactical doctrine of a "close-and-deliver" medium tank armed for high-intensity, close-quarter (1,000 meters on the average) combat. Given this philosophy, there remained only one concern, the British *Chieftain*.

The Chieftain's Threat

Though small in numbers fielded, the design concepts of the *Chieftain* that embodied heavy, well-sloped armor, and a big gun at the expense of mobility, certainly had to strike close to the heart of the *IS-II* and *T-10* designs. Of even more importance would be the British plans for obtaining a kill-to-loss ratio of 4:1 with their *Chieftain's*

superbly-refined rifled cannon and battlesight systems.³ Faced with a need to overcome growing numbers of stockpiled antitank missiles, a considerably greater battlefield density of enemy tanks compared to the war years, and now a tank specifically designed to deny them the advantage of their tank numbers and their powerful, though short-ranged cannons, the threat of the *Chieftain* must have been viewed as a very unpleasant fact by the Soviet tank designers.

The Soviet Requirement

Faced with the prospect of going to war again with a very proficient medium tank design, whose tactical features, however, were threatened by the West's development of consistently heavier and harder-hitting tanks, it seems reasonable that the Soviet designers had to look at producing a counterweapon. And, given the long-term developments in the west that were now producing the *M1 Abrams*, *AMX-32*, *Leopard II* and the *Chieftain's* successor, *Challenger*,^{4, 5} the threat became crystal clear: once again a Soviet heavy tank must be developed for the breakthrough role, if for no other purpose than to hunt down and shoot it out on a one-for-one basis with the western main battle tanks (MBT). For example, the West German *Leopard II*, alone, points out the Soviets' need for a new long-range, heavily-armed "animal hunter."

Justification for Design—Why the T-64

As we noted in our previous article,¹ we do not believe the design of the T-64 was a mistake. Many attributes of the T-64 fit the solution to the problems under discussion and deserve consideration.

The *Chieftain* was the single heavy tank project to go into full production in the mid-1960's. By Soviet standards, it was a logical, simple design placing emphasis on the gun first and armor second, exactly as the Soviets would

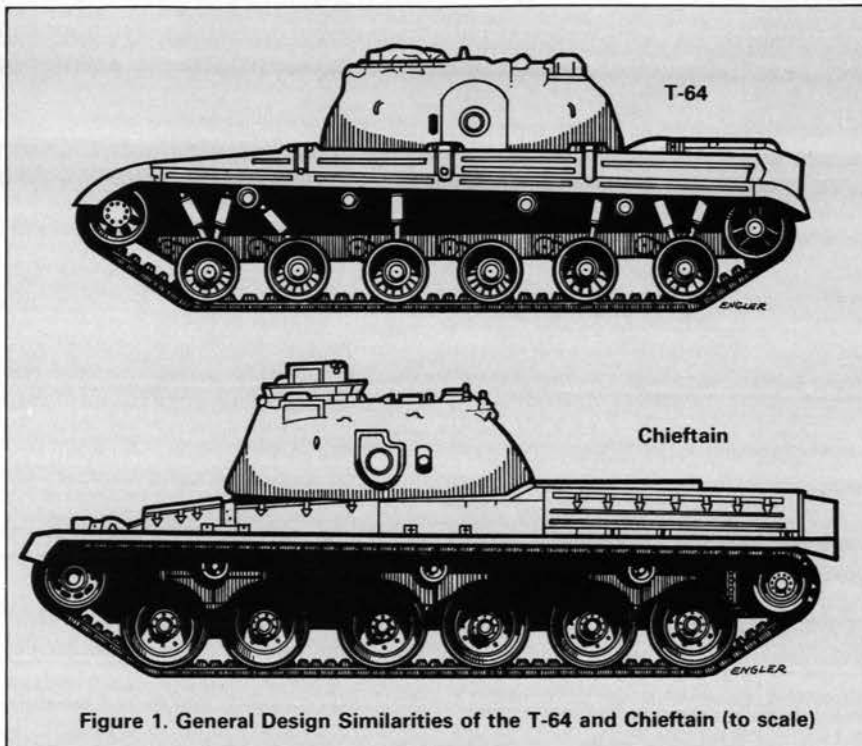


Figure 1. General Design Similarities of the T-64 and Chieftain (to scale)

have done. Also, while simple by comparison with American and West German concepts, all of its features (with the exception of the cannon rifling) are now being adopted in other western armies, while high-technology proposals of the US/German MBT-70 have generally fallen by the wayside. Therefore, given the Soviets' limited ability to produce high-technology, electronic-intensive weapons, and with a historic pattern of borrowing heavily from western design development, the importance of the *Chieftain* grows abundantly clear.

There are many similarities between the 1960's *Chieftain* and the 1970's *T-64*. They both mount large guns (with the Soviets maintaining the characteristic several-calibers lead), both use a track running on smaller than Christie-style road wheels with return rollers, and both are driven by a flat, opposed-piston diesel engine.⁵

Perhaps even more amazing is the remarkable similarity between the vehicles where hull configuration is concerned (figure 2). Both use a reclining seat for the driver, allowing a severely sloped glacis for excellent ballistic protection.^{3, 6} The turrets, both semispherical to the midpoint (gun in battery) are virtually devoid of mantlets. The British completed the turret in a square pattern with internal stowage, compared to the round turret of the *T-64* with external fittings.^{3, 6} The panniers of both are also wedge-shaped, fitted with tool boxes or fuel cells. However, more impressive than

any other example of parallel development is the general size and shape of the vehicles. If the skirts over the suspension of the *Chieftain* are removed and both turrets traversed so the gun is trained over the sponson to face the viewer, the two vehicles are close enough in external appearance to be readily accepted as coming from the same family (figure 1). So remarkable is the general similarity that one is immediately led to ask if, as in the case of Chobham armor, the plans to the entire *Chieftain* tank were smuggled off at some point in the distant past, to be developed in the Soviet pattern shop as the *T-64* at 90 percent scale to more snugly fit their smaller tank crewmen. It appears that at least some good amount of Soviet attention is paid to the British tank designers. So we must consider one more British design concept.

The Valiant Concept

One important design consideration, which should not go unstressed, is the continuing developments by Vickers in Britain of combat vehicle standardization. The Vickers' efforts to produce a standard tank chassis, which permits the application of various levels and types of armor protection and a choice of different caliber cannons, is simple in concept and apparently effective in practice. While we consider the design features of the forthcoming Soviet tanks and the possible transfer of concepts from the 1960's British tank to the 1980's Soviet vehicle, we might also consider the Soviet development of a

standard vehicle chassis onto which various armaments might also be fixed.

Design Features for the T-85 Heavy Tank

Though there are many rumors about Soviet tank design features some make sense, given past developments. We will endeavor to work through as many as possible while emphasizing the most direct possibilities in order to present a picture of the most probable vehicle (figure 2).

Longer hull—Very brief reports have been released suggesting that the hull of a Soviet tank now being tested is somewhat longer than the present *T-64* and *T-72*.⁸ with greater spacing between road wheels. Although there is a possibility that this is an optical illusion, rumors of the armor, engine, and turret differences lead us to accept the lengthened hull as fact.

Armor—As we have seen in the November-December 1981 issue of *ARMOR Magazine*⁹ in the reprint of a *Znamenosets* article on the *T-72*, the current Soviet tank production models seem to be sporting some form of laminated armor on the glacis. This armor was rated against common steel armor and the British-developed Chobham armor, earning a "2" if steel armor was rated "1" and Chobham rated "3".¹⁰ However, rumors from Germany still abound about a Soviet development of special, perhaps Chobham-style armor—¹¹ a development undoubtedly assisted by the Chobham sample smuggled to the Soviet Union.¹² We are skeptical about an envelope of this armor on a future Soviet tank in the pattern of western armor because it stands to reason that a Soviet armor laminate on the severely reclined glacis would very likely give as much protection as Chobham. Thus, the heavy and bulky Chobham-style armor could be reserved for the turret face and sides alone. Not only would this reduce the cost per vehicle, but it would also support the current discussion of Soviet tanks having been seen sporting a square, i.e., Chobham-style, welded turret on an otherwise standard T-series production chassis,^{13, 14} which might weigh up to 45.8 tons.^{7, 8, 13} If true, this would be a very cost-effective answer to the Chobham envelope armor problem.

Suspension—Rumors also abound about a new Soviet vehicle that is soon to be fielded with a hydropneumatic, variable-geometry suspension.¹⁵ Though such a development is possible, it seems unlikely that such would be the case.

Since the *T-34*, Soviet tank hulls have been reduced in height to provide a lower overall silhouette. Therefore,

we wonder if rumor, passage of time, and component changes, such as the 14 shock absorbers on the *T-64* have led some to believe that it was equipped with a hydropneumatic suspension. The high number of shock absorbers is best explained as being a requirement for a high-speed chassis, protecting torsion bars from heavy strain in high-speed, cross-country maneuvers under the assumed heavier weight of 48.5 tons.

Another suspension question concerns the wheels. Are the road wheels for the *T-64* family rubber-tired, or steel-sheathed, as in the original Soviet *KV* series and the later WW II German *Tiger II* heavy tanks?^{15, 16} If the latter, then we may see again that the *T-64* may be a progenitor of a heavy tank. This assumption is supported by the fact that rubber tire failures on the road wheels of heavy tanks have been a persistent problem, apparently best solved in Soviet circles by encasing the rubber as an internal shock absorber in the wheel, even at the cost of reduced track life.¹⁷ The live track of the *T-64*, a recent addition to the Soviet tank family, seems to run on a standard Vickers-type suspension, with return rollers, that reduces the tendency for the track to be thrown at high speeds, or in sharp turning maneuvers.

Another interesting question to consider is whether the new Soviet tank at its heavier weight will appear with the

characteristic seven road wheels per side as was the case of the Soviet *T-10* heavy tank of 50 tons.² Though only the *T-10* had seven wheels (the rest of the *KV* family had six), given the rise in weight from the 38 tons of the *T-64* to the projected 48.5 tons, we could readily understand the addition of an extra pair of road wheels to support the added weight. Studies of the seven-road wheel configuration or of the considerably lighter West German *Leopard I* demonstrated that the additional pair of wheels reduced wear on the torsion bars and bearings, while extending the life of the suspension.¹⁸ This, in turn, might partially explain the lengthened hull.

Finally, we might consider the probability that, as in the BMP, the driver will steer the vehicle by means of pneumatically-assisted controls. Driver fatigue should be reduced, and considerably better vehicle control at high speeds and more nimble response in maneuvers should promote a higher level of mobility to the *T-64* family.

Engine—The most recent western publications list the *T-64* as equipped with an 700-750-hp engine.¹⁹ It is reported to be a 5-cylinder engine with opposed pistons,¹⁹ which we suspect leads to a total of 10 pistons. Again, rumors suggest that a more powerful engine is in development. Speculations are that a turbine engine, recently observed tested in a wheeled vehicle,¹¹

may be the new 1,000-hp powerplant for the next generation of Soviet tanks.²⁰ We are hesitant to agree. For example, we might consider the development of the Daimler-Benz *MTU MB837*, 630-hp, V8 installed in the Swiss *Pz61*, which saw service as the *MTU MB838* in a 10-cylinder, 830-hp, 90°-V engine installed in the *Leopard I*.⁴ By using the same power increase ratio, we could then see a 12-cylinder piston engine, otherwise basically unmodified, producing 1,080-hp. Or, applied to the current 10-piston 750-hp engine of the *T-64*, a jump to 983-hp with the addition of another cylinder and two pistons. We also wonder if, like the *L60* engine in the *Chieftain*, the *T-64* family's engine is a development of the Junkers Jumo aircraft engine? In as much as the aluminum block engine of the *T-34* was a diesel aircraft engine,²¹ paid for the Soviet Air Force and adopted by the Red Army under what might be considered a "take the best available" argument, the possibility of another aircraft engine being added to the tank forces is logical.

Though they may be suffering teething troubles similar to the 16 years of difficulties with the *Chieftain's* *L60* engine,²² the Soviets have had a long time to get to know the engine. It also makes sense that a 1,000-hp engine would be more than sufficient to move a 48.5 ton tank at the same relative speed as the 1,500-hp turbine used to move an M1

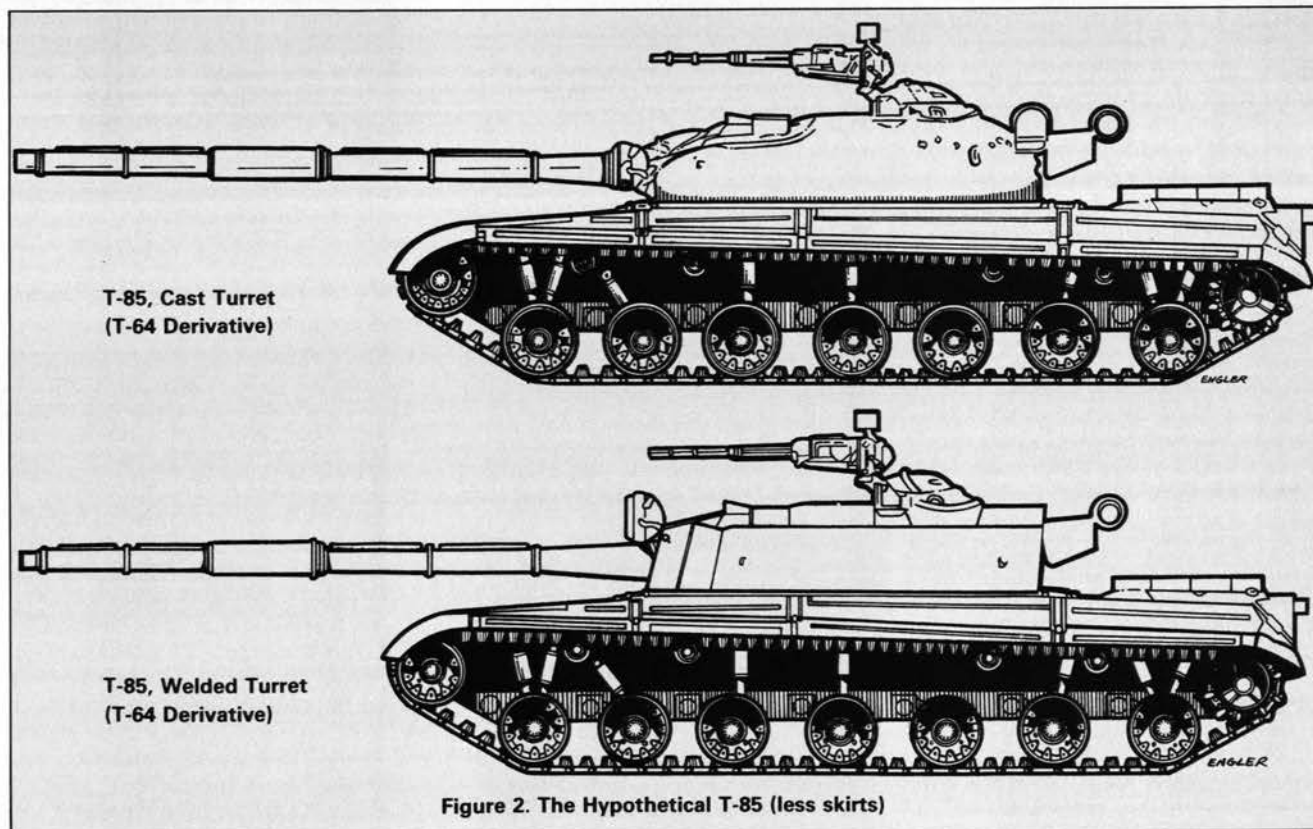


Figure 2. The Hypothetical T-85 (less skirts)

Abrams' 62 tons.

Transmission—One of the major stumbling blocks to Soviet tank development has been the transmission. This problem has now probably been handily solved by the importing of five *Lion* (Italian-constructed *Leopard I*) main battle tanks from Libya.^{14, 23, 24}

"And it holds the promise of a suitably-sized caliber for future development of the aluminum-based HEAT round, where overkill is . . . an important factor in armor penetration."

Skirts—Observations of Soviet field tests have apparently resulted in reports that forthcoming tanks will carry lightweight skirts¹³ such as those observed during the testing of an early T-64 hull carrying a T-62 turret.^{25, 26}

Gun—Since we have followed the possible wide-ranging influence that the superb physical characteristics of the *Chieftain* may have had on the Soviet design team, we should also consider the impact of the 120-mm L11A2 rifled cannon. Recent rumors about upcoming Soviet tanks (T-80 and follow-on) have stressed that the gun appears similar to the 125-mm cannon now mounted on the T-64 and T-72.¹¹ Though it is very probable that the smoothbore cannon will once again be employed for its high velocity, flat trajectory profile that provides excellent grazing fire (battlesight) capabilities, we must consider the possibility that the Soviets will again attempt to mount a version of their superlative 130-mm rifled cannon. And given the previous identification problems of specifying the T-64's 125-mm cannon as a 122-mm cannon, it may just be that a new and larger gun is being fitted in succeeding vehicles.

Since the mid-war years, the Soviets have either prototyped or fielded a 130-mm rifled cannon on four distinct chassis; the ISU-130 assault gun, the SU-130 on the T-54 chassis, the T-14/130 on T-10 chassis and the latest, the SU-130 on the T-62 chassis.^{3, 27} Though each has apparently now been withdrawn from service, it is significant that cannons mounted as assault guns, like the T-62-based SU-130, have routinely appeared a short time later in a turreted tank form. Thus, it is interesting to again see a corps gun (artillery regiment of an army)^{8, 28} mounted on a self-propelled assault gun chassis just as the 122-mm gun was mounted on the ISU chassis prior to fielding in the IS-II heavy tank. Thus, all Soviet gun designs have slowly been creeping up in caliber to the present 120/125mm.

But there are two schools of thought; the aforementioned high velocity, flat trajectory profile currently in vogue with American, Soviet, West German, and French designers, and the British concept of using a large high explosive squash head (HESH) round to batter the enemy tank to pieces. The former is undoubtedly well into its own where the Soviets are concerned about easy targeting and good penetrating power from close range on their great numbers of medium tanks.

As with its WW II predecessors, a new Soviet heavy tank would be faced with dozens of medium and heavy crew-served antitank missile launchers which would require a very effective HE round. Yet, at the same time, a replacement for the high-explosive antitank (HEAT)-armed BRDM missile carriers, which stand to be rendered ineffective as overwatch vehicles by the western use of Chobham armor, sees the necessity of a 3,000-meter (+) long-range, gun-armed tank with the high accuracy and hard punch to supplement the scores of medium, smoothbore-armed tanks firing at close range on the move.

"Finally, we might consider that unlike the gun-loading difficulties encountered in the T-10 heavy tanks the new Soviet auto-loading systems are already in service and certainly capable of handling the 130-mm round and propellant charge."

Astute readers are going to object that mounting a 130-mm rifled cannon on a T-64 chassis at only 38 tons is too much to ask of such a vehicle, since jump dispersion would be enhanced to the detriment of fire accuracy. To this charge we bow. But, as we have noted, the weight of the upcoming series of tanks is soon to become 48 tons. Thus the weight factor seems to be adequately accounted for, just as it was in the entire IS/T-10 family of heavy, rifled-gun tanks at 45-50 tons. What would seem to be a greater problem would be the larger turret—and turret race—to accommodate the enlarged breech and recoil assembly. Again, we must remember that vehicles have been observed not only with a longer hull, but with an altogether different, box-shaped turret,^{13, 14} which we suspect might be longer than the current semispherical turret, at which point the characteristic Soviet turret paniers would be expected to be enlarged to accommodate a larger turret race.

Finally, we might consider that unlike the gun-loading difficulties encountered in the T-10 heavy tanks the

new Soviet auto-loading systems are already in service and certainly capable of handling the 130-mm round and propellant charge. The 130-mm is well tested and well received by those fortunate to have it. The PLO has testified to its worth²⁹ and even the Israelis have been rumored to have considered it for the principal weapon in their new *Merka* MBT.⁴ As a weapon greater in caliber than the largest in-service western cannon, the 130-mm could be readily adopted. And it holds the promise of a suitably-sized caliber for future development of the aluminum-based HEAT round, where overkill is such an important factor in armor penetration. Last, but not least, British contentions that a rifled cannon may prove to be cheaper in service compared to smoothbore cannons must be a contributing factor³⁰ in the Soviet choice of a rifled cannon.

Sights—The continued Soviet developments in the laser optics field for their tank sights³ promises to deliver a Soviet tank equipped with analog computers,³ that can trade round-for-round with western tanks on acceptable terms, and provide long-range stand-off fire against hard-to-spot, crew-served antitank guided missiles (ATGM) positions.

Mobility—As we have noted, the engine and suspension seem to present growing evidence of Soviet intentions to field a vehicle with mobility characteristics similar to their triumphant T-34. If they are successful, the need for the SU chassis, as a base on which to mount a large antiarmor weapon on a platform possessing similar mobility to the current medium weight tanks, will have diminished.

" . . . the Soviet armament development teams deliver new equipment in far shorter research and development cycles than . . . the American experience."

Where to look for the T-85

As we are well aware, the Soviet armament development teams deliver new equipment in far shorter research and development cycles than the average of up to 20 years common to American experience.^{1, 31} If the T-64 was strictly a new medium weight tank, we would expect it to be deployed strictly on a replacement basis for older equipment. But since the T-72 seems to meet the criteria for that role, being deployed in medium armor regiments of 95 tanks, we have to determine where and how a T-64 would fit in as a progenitor to a heavy tank.

Looking again at WW II history, we

find that by 1943 the Soviets had developed specific heavy tank regiments having around 21 vehicles,³² at a time when a medium tank brigade (3 regiments) had 63³³ tanks. After the war, the size of Soviet tank units was standardized and the number of tanks per unit gradually increased to where a Soviet battalion having 31 to 40 tanks compares favorably with western units of the same size.⁸ This is about twice the number of vehicles in the Soviet WW II units. To apply this ratio to the heavy regiment, we would again reach a number of approximately 42 vehicles. Yet, if we suggest that a heavy tank formation is to be included again in the Soviet mobile division, we would face the problem of explaining the sudden appearance of the mysterious battalion-sized formations of 51 tanks that were assigned to Soviet motor rifle divisions around 1976.²⁸ Hand-in-hand with this development it was reported that high-priority units in the Group Soviet Forces Germany (GSFG)⁴ were being reequipped with a vehicle whose purpose was explained as a participant in a runoff for a successor medium tank. We wonder again.

Is it not possible that the T-64 was fielded, as was the T-44, to allow the

user units to become acquainted with the vehicle family they were soon to use? Is it not possible that the units receiving the new T-64 tanks were indeed specially selected units to be trained and equipped, not for the role of tank replacement battalion or artillery overrun battalion,³⁴ but as a new heavy tank battalion to overwatch the motor rifle division and assist it in achieving the breakthrough into which highly mobile tank divisions would cascade into the rear of the Allied lines? If this is true, then we have reason for a "failure" like the T-64 to be placed with Soviet units in Germany, while never being seen overseas. We believe that just as our forces are working up with the initial production M1 Abrams in West Germany in 1982, the Soviets are working up with the initial models of their soon-to-arrive heavy tanks, the T-64/85. The only difference is, they have been training since 1976.

The authors wish to extend a special note of thanks to authors Steve Zaloga, James Grandson, James Steuard and their associates. Their meticulous research and detailed reporting of armor from WW II to the present, have more than once set us thinking along a new direction. Though we assume full re-

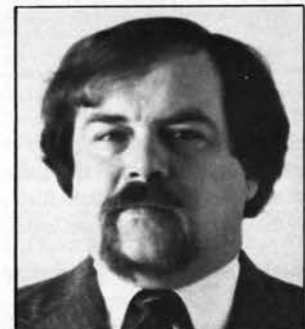
sponsibility for all erroneous theory and assumptions in this discussion, we wish to acknowledge the fact that this article could never have been properly developed without their fine efforts.

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JOSEPH R. BURNIECE attended the University of Minnesota, where he studied history and historical geography, receiving his B.A. in History in 1974. Upon graduation, he continued his studies in military history with emphasis on the evolution of tactics and doctrine in response to the development of new weapons technology. Currently Mr. Burniece is involved as a research analyst in the design and development of analytical training systems with Summit Simulations, Inc.



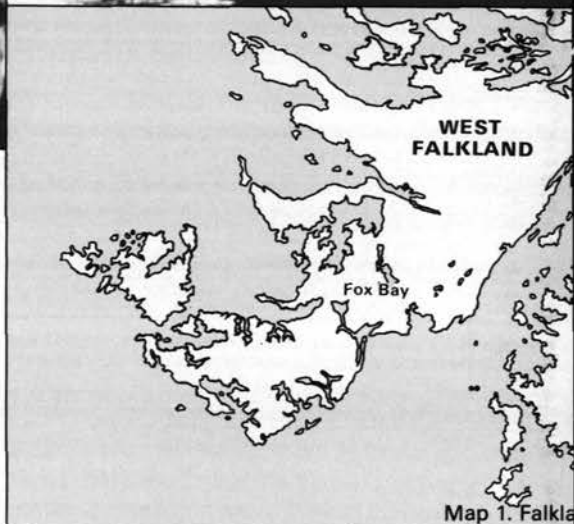
PAUL A. HOVEN served as a combat assault helicopter pilot and flight commander in Cambodia and Vietnam with the 9th Infantry Division, achieving the rank of chief warrant officer. Upon return, he completed his studies at the University of Minnesota and Mankato State University, graduating with a B.S. in Political Science and Education in 1973. Mr. Hoven is currently a weapons analyst and researcher with Summit Simulations, Inc., where he is involved in the design of tactical training systems.



Above. Though on the way to war, the Blues and Royals still had time for a bit of levity.

Center. The Blues and Royals drive toward Port Stanley with their colours flying.

Left. A Scimitar fords a stream during a cross-country march.



On 4 April 1982, 2 days after the invasion of the Falkland Islands by Argentinian forces, the Blues and Royals, a medium reconnaissance regiment stationed at Windsor just outside London, received orders to provide two reconnaissance troops for deployment with the Falkland Island Task Force. Each troop was to consist of two *Scorpion* and two *Scimitar* combat vehicles, reconnaissance (CVR) with a *Samson* recovery vehicle in support. Two troops from B Squadron were selected, taking with them their normal complement of officers, NCOs, and troopers. There was no question of stacking the team. All over the United Kingdom, as the national mood evolved through consternation to concern mixed with pride and determination, hectic military preparations were under way. The Blues and Royals were no exception. Within a period of 24 hours, vehicles and weapons were checked and prepared for combat in a subarctic climate and crews completed their administration. Some 5 days later the vehicles were safely embarked on the MV *Elk* and the crews embarked on SS *Canberra*. Both ships were requisitioned from the merchant fleet. Thus it was that 3 and 4 Troops, B Squadron, The Blues and Royals, now under operational command of Headquarters 3 Commando Brigade, came to form the armoured

element of a British force that, under the fascinated gaze of the world, was to effect the liberation of the Falkland Islands 10 weeks later.

At this point, some background on these famous regiments, the men, and their equipment may be necessary for those unfamiliar with the British Army. The Blues and Royals (The Royal Horse Guards and 1st Dragoons) were formed as a regiment in 1669 by the amalgamation of two of the oldest and most famous cavalry regiments of the British Army, The Royal Horse Guards (The Blues) and The Royal Dragoons (1st Dragoons). The Blues trace their descent from a Parliamentary regiment which established such a fine reputation for itself during the English Civil War that in 1661 King Charles II, on his restoration, incorporated the regiment into the British Army. The Royal Dragoons by origin were raised in London also in 1661 for service overseas in the garrison of Tangiers. Individually, or side by side, the two regiments fought in the majority of the British Army's major campaigns. Together with the Life Guards, presently an armoured regiment in Germany, the Blues and Royals form the Household Cavalry. Historically they are the Sovereign's Bodyguard and retain the additional function today of providing mounted squadrons for

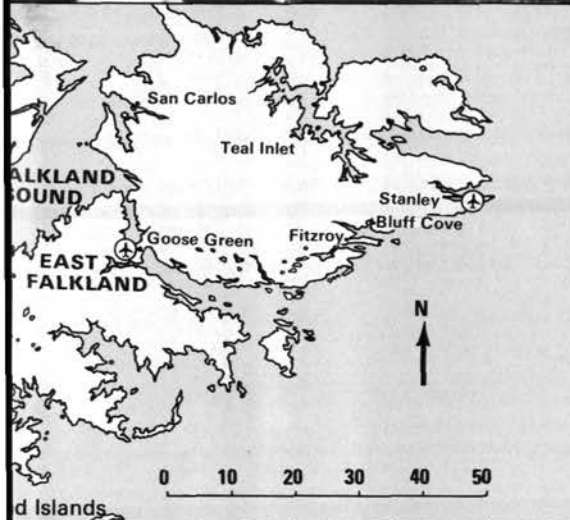
British Armour

by Lieutenant Colonel Andrew
Photo of Household Cavalry

ceremonial duties in London.

The Blues and Royals are equipped for their reconnaissance role with CVRs manufactured by Alvis Limited. The family of CVR vehicles was developed to fulfill a British Army requirement for a weapons system capable of carrying out the roles of reconnaissance, fire support, and antiarmor and yet be sufficiently light to enable two of the vehicles to be loaded into a *C-130* aircraft. They can also be lifted by *CH-47* helicopter.

The best known vehicle of this family is the *Scorpion*, a very fast, agile, light tank that, with its 8-ton weight, but low ground pressure, can traverse bog and other difficult terrain where even a walking man might have difficulty. Excellent protection for the three-man crew includes aluminum armour and a full NBC system. The main armament is a 76-mm medium-velocity gun capable of firing high-explosive, squash-head (HESH), high-explosive (HE), canister, smoke, and illuminating rounds out to an effective range of 5,000 metres. The turret has a 7.62-mm coaxially-mounted machinegun. A day



Above. In more peaceful times, the Blues and Royals serve as part of the Household Cavalry.

Right. A Scorpion and Scimitar at a halt during a lull in operations. Note the kinetic energy recovery rope draped across the bow.



In the Falklands

R. Jones, Royal Tank Regiment
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and night capability is provided by a second generation night sight in the gunner's position.

The companion vehicle, *Scimitar*, is similar to *Scorpion* in every respect except that it mounts a 30-mm Rarden high-velocity cannon. Firing armour-piercing, discarding sabot (APDS), HE, and armour-piercing, special effects (APSE), the Rarden can kill any armoured personnel carrier or mechanized infantry combat vehicle it is likely to meet and is effective against many other armoured vehicles.

The *Scorpions* and *Scimitars* were supported on this operation by a further CVR variant, the *Samson*, for recovery and repair. Therefore, the CVRs were ideally suited for strategic deployment, in conditions of limited shipping space, and yet possessed the essential characteristics for tactical deployment in the Falkland Islands where a combination of harsh weather, hostile terrain, and enemy action was to put the proven versatility of CVRs and their crews to a severe test.

Throughout the days of the long voyage to the South Atlantic, the Blues

and Royals joined with the rest of 3 Commando Brigade in a rigorous training routine of fitness, first aid, personal weapon, and specialized training. During a short stop at Ascension Island, crews and vehicles were reunited for a few hours of valuable gunnery practice when, for once, there was no limit on the allocation of ammunition. Vehicles were prepared for wading.

The Task Force was organized for operations in the South Atlantic into a carrier group, amphibious warfare group, of which 3 Commando Brigade was the land force element, and a logistic tail. The staff of the amphibious warfare group on board the assault ship *HMS Fearless*, off Ascension Island, were by now deeply involved in planning the operation in which 3 Commando Brigade would make its landing in force on the Falkland Islands. The pause at Ascension Island was used not only for training for the forthcoming landings but also to redistribute the men, vehicles, weapons, and supplies into a more logical order for the assault. Among these, 3 and 4 troops were transferred to *HMS Fearless*. On 25 April an advanced detachment from the Task Force retook South Georgia Island, an essential prerequisite to domination of the South Atlantic operational area. As the task force sailed south from Ascension Island, it

gathered the potential of a coiled spring increasing in compression and strength, but time, atrocious weather, and the enemy threat seemed likely to corrode that strength unless a landing on the Falklands were to be made within a few weeks. When *HMS Fearless*, together with the amphibious group, entered the total exclusion zone off the Falklands on 18 May, the time and place for the landings had, therefore, been decided on.

The plan proposed a landing in the San Carlos area on East Falkland Island. 40 Commando and 2d Battalion, the Parachute Regiment (2 Para) would land first in the area of San Carlos settlement, to be followed by 45 Commando at Ajax Bay nearby, and 3 Para at Port San Carlos (Map 1).

In the early hours of 21 May, concealed by darkness and covered by a deception plan of diversionary raids around the coast of East Falkland Island, the amphibious force made its approach through Falkland Sound to the shelter of San Carlos water. From there, under a bright, starlit sky, the landing craft launched towards the clearly visible shoreline. As in all such operations of war, the unexpected is to be expected. In particular, 40 Commando discovered that overhanging rocks on its designated beach prevented the disembarkation of its CVRs.

Table I.
British Order of Battle

3 Commando Brigade

40 Commando, Royal Marines
42 Commando, Royal Marines
45 Commando, Royal Marines
29 Commando Rgmt, Royal Artillery
59 Commando Sqdrn, Royal Engineers

5 Infantry Brigade

2 Battalion, Scots Guards
1 Battalion, Welsh Guards
1 Battalion, 7 Gurkha Rifles
4 Field Regiment, Royal Artillery
36 Regiment, Royal Engineers

Attached for Operations

3 & 4 Troop, Blues and Royals
3 Battalion, Parachute Regiment
2 Battalion, Parachute Regiment

By daylight however, all objectives had been secured against only isolated opposition and the light tanks were safely disembarked on an alternative beach. The commandos and paratroopers rapidly set about digging a strong defensive position. Patrols were sent out on a vigorous programme aimed at domination of the area. Air defense was coordinated as both the soldiers and the sailors of the amphibious group braced themselves for the inevitable air attacks. Nothing, however, could be allowed to interrupt the relentless pressure to build up a strong logistic base on which future exploitation would depend. Throughout this phase the Blues and Royals formed an essential component of the defenses providing potential direct fire support from dug-in positions. They were given plenty of opportunity to try their skill in the air defense role when enemy air attacks commenced shortly after noon on D-Day. The Argentinian aircraft flew in low over the ships clustered in San Carlos water inflicting a growing number of casualties. The coaxially mounted 7.62-mm machineguns of the *Scorpions* and *Scimitars* added their part to the weight of fire directed at the enemy aircraft skimming low through the anchorage. One *Scimitar* claimed a 30-mm hit on a *Skyhawk* at a range of 1,000 meters. Over the next several days of the buildup, as the helicopters and landing craft plied incessantly between the ships and shore, the light tanks were frequently employed in the role of carriers as every available vehicle was pressed into service for the logistic effort.

With the vitally important landings successfully consolidated, the CVR crews had time to contemplate what lay ahead for them. The most cursory assessment of the Falkland Islands terrain will show that the going for any vehicle is tough and, in many places, impossible. With the exception of the vicinity of Port Stanley there are no graded roads as such, only tracks joining the widely-dispersed settlements. These tracks frequently become impassable in winter and the majority of

intercommunication in the Falklands in peacetime is either by light aircraft or by coastal shipping. The most significant feature of the islands is the bare and open moorland. There are few trees that can survive the severe climate. The openness is deceptive however, because quite extensive areas are bog and waterlogged ground. As the ground rises to the central mountainous area, steep outcrops of rock interspersed with small ravines, impede movement. It is understandable that the prevailing view was the CVR would be very restricted in mobility and, after being "bogged," recoverable only by considerable digging effort. Therefore, it was believed that the light tanks would be able to play little useful part in the infantry battle. Happily, the inherent mobility of CVR and the skill of the crews was to prove otherwise.

When, on 27 May, the impatiently-awaited moment arrived to exploit outwards from the bridgehead, 3 and 4 Troops were task-organized in support of 45 Commando during their move round the northern route towards Stanley, and of 3 Para in their advance to Teal Inlet. The advance of 2 Para on Goose Green and Darwin to the south was unsupported by CVR, partly as a consequence of the prevailing view of CVR mobility.

The move of 3 and 4 Troops went well for CVR. Drivers quickly adapted their techniques to the rugged terrain. Aggressive driving and maintenance of vehicle momentum paid off. The sensation of driving across the waterlogged surface was described as similar to driving on a water bed. Following vehicles learned not to cut through the crust. On the few occasions when vehicles did become "bogged," they were quickly recovered by companion CVRs using the single kinetic energy recovery rope with which each vehicle was equipped. By the end of May, when 45 Commando and 3 Para were completing their gruelling 50-mile march through the bleak landscape to the high ground to the west of Port Stanley, the accompanying CVRs had proved themselves as the only type of vehicle

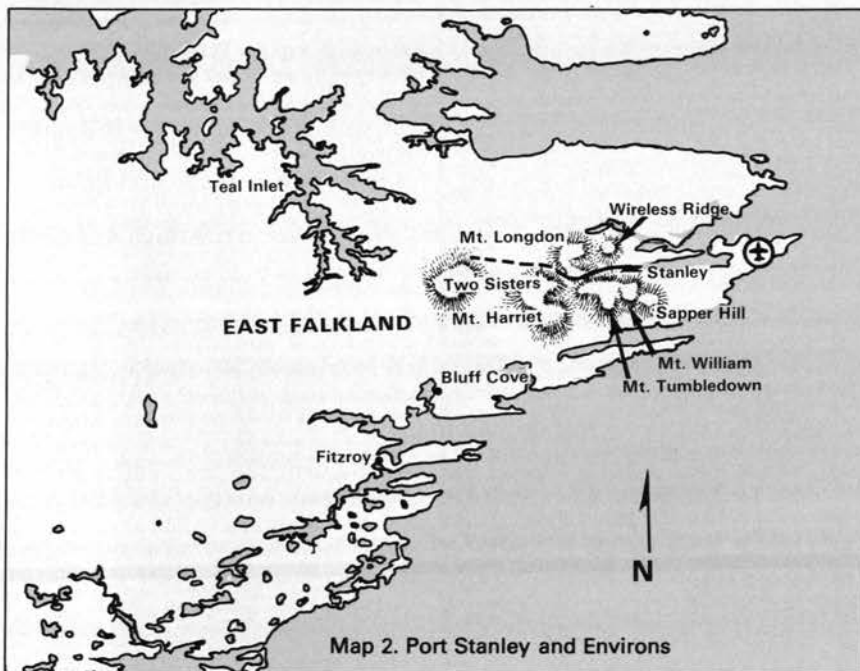
in the Falklands capable of effective operations in the terrain.

On 1 June, the leading element of 5 Infantry Brigade landed at San Carlos. The brigade had been dispatched to the South Atlantic in the requisitioned liner, *Queen Elizabeth II*, (QE2), as the second major formation of the land forces. At a rendezvous off South Georgia, QE2 had transferred her 3,300 troops and their supplies to the ships of the amphibious group. By 3 June, the brigade had completed its disembarkation at San Carlos without a single casualty. They brought with them the Commander, Land Forces, Major General Jeremy Moore. On 1 June, 2 Para at Goose Green came under command of 5 Infantry Brigade and, having been relieved in place by 1/7 Gurkha Rifles, were flown forward to seize Fitzroy and Bluff Cove. Thus, the two brigades were closing in on Port Stanley.

It became clear from these moves that the 5 Brigade position at Fitzroy was in some danger until the remaining battalions could be brought up from the west. It was decided to place 3 and 4 Troops under command of 5 Brigade, transferring from 3 Commando Brigade in the north. The best estimate was that the *Scorpions* and *Scimitars* would take about two days to make their way through the mountains. In fact, they took just 6 hours. The commander of 5 Brigade, faced with the urgent task of consolidating his hold on Fitzroy against possible counter attack, described the occasion. "I never expected them to make it so quickly over the difficult ground. When I looked and saw them winding down the side of the mountain toward us, their leading troops mud-spattered and rain-soaked and their commanders half-frozen in the turrets of their vehicles, it was one of those moments I am not likely to forget."

The next few days saw the process of redeployment and logistical preparation for the attack on the Argentinian positions on the high ground dominating Port Stanley.

At Bluff Cove, on 8 June, the troopers of the Blues and Royals were to witness the ravaging attack on the logistic ships *Sir Galahad* and *Sir Tristram* in which 1st Battalion, Welsh Guards, in particular, sustained heavy casualties. The *Scimitar* crews of 3 Troop were able to engage the low-flying aircraft with their 30-mm Rardens. Some local civilians, observing nearby, claimed to have seen a 30-mm shell hit its target. One gunner loaded and fired the cannon himself while the commander was temporarily out of the vehicle. In the aftermath of the strike, the vehicles were put to use carrying some of the



Map 2. Port Stanley and Environs

more seriously wounded survivors from the beach to the medical aid post.

Despite the loss at Bluff Cove, the process of preparation for the critical battle for Port Stanley continued at an inexorable pace. Helicopters were ubiquitous and in heavy demand with priority going to the buildup of ammunition stocks in the gun lines. The question of resupply elsewhere was critical. The *Scimitars*, for example, were loaded and stowed with over double their normal capacity for 30-mm rounds in preparation for the battle. A strict fuel economy routine was imposed, and engine running time was minimized.

By 11 June, the British land forces were ready for the final battle for Port Stanley, a battle that was to test not only the aggressiveness and technical skills of the British commandos, paratroopers and infantry, but equally the ability of the artillery, naval gunfire support, light tanks, and fighter ground attack and their various headquarters to coordinate their limited logistic resources into a controlled and devastating attack by firepower. Throughout the slopes and rockfalls of the mountains of the Eastern Falklands the soldiers made their last preparations. Patrols probed and scouted the enemy positions and artillery registered on the opposing heights.

Major General Moore's plan was for a three-phase attack. In the first phase on the night 11/12 June, 3 Commando Brigade were to capture Mount Longdon, Two Sisters, and Mount Harriet. In the second phase, on the night 12/13 June 5 Infantry Brigade and 2 Para, now back under command of 3

Commando Brigade, were to capture the high ground closer to Stanley, namely Wireless Ridge, Tumbledown Mountain, and Mount William. Finally, in the third phase, Welsh Guards, reinforced by two companies of 40 Commando, were to capture Sapper Hill. The enemy was in strength on all these terrain features. All the attacks were planned to take place at night (Map 2).

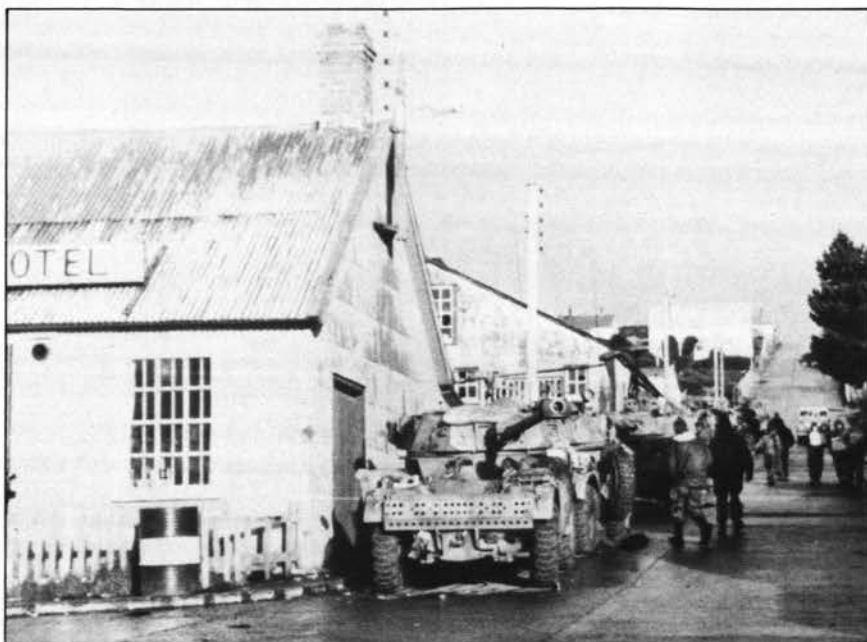
The first-phase attack was opened by 3 Para with their assault on Mount Longdon. Initial surprise was achieved in the darkness, but the enemy were soon alert and resisted fiercely with heavy and accurate fire. 4 Troop provided valuable direct support with their 76-mm, firing HESH. The battle for the eastern sector of Mount Longdon was to last 6 hours and, for the western half, a further 4 hours. The enemy positions were captured by a process of calling for very close fire support, at times within 50 metres of the leading British troops, by the systematic destruction of enemy bunkers using light antitank weapons and grenades, and finally by closing with the enemy in hand-to-hand fighting with fixed bayonets. The position was finally cleared as daylight came through a thick dawn mist. 3 Para had lost over 20 killed in this attack and 47 wounded.

Meanwhile, 45 Commando had successfully taken Two Sisters, again by a process of closely coordinated fire support and skillful infantry tactics. 42 Commando made an indirect approach to Mount Harriet and, after a brief firefight, were in possession of their objective, taking 300 prisoners. By first

light on the morning of 12 June all of the 3 Commando Brigade objectives had been taken, frequently against fierce and very determined opposition, and the attack was a complete success. Later on 12 June as battalion commanders of 5 Infantry Brigade were issuing their orders for the phase-two attack that night, news came of a 24-hour postponement to allow more detailed reconnaissance. 3 Troop were to be in support of 2 Para for their attack on Wireless Ridge to the North, and 4 Troop were to support 2nd Battalion, the Scots Guards against Tumbledown Mountain.

The Scots Guards attack on the night of 12/13 June was preceded by a sharply fought diversionary action against an enemy position lying to the south of the battalion objective that covered the main track from Fitzroy to Port Stanley. A strong patrol of Scots Guards supported by 4 Troop moved after darkness eastward in search of the enemy position. As the time for the main battalion attack approached no contact had yet been made in the pitch darkness when suddenly the troop leader's *Scorpion* struck a mine and was immobilized. Although badly shaken, none of the three-man crew was hurt. "Shaken but not stirred" was to be their later comment. The troop leader quickly moved to a neighbouring CVR to direct fire support from there. Now separated from the CVR, the infantry pressed on and shortly found themselves among an Argentinian platoon position. The ensuing fight, lasting about 1½ hours, ended with the capture of the enemy trenches and the destruction of the Argentine defending force. The patrol then extricated itself carrying its wounded through a minefield where two more of its members became serious casualties. Harrassed by accurate mortar fire they finally rejoined the CVRs. 4 Troop then resumed their direct fire support this time for the main battalion attack which was developing against Tumbledown Mountain. There the enemy was able to bring down accurate mortar, machinegun and sniper fire. It was only by means of a rapidly coordinated bombardment and determined company assaults that the last of the objectives was finally taken by daylight. The Argentine commander subsequently admitted that he had been entirely deceived by the diversionary attack into thinking it was the main attack on his position.

Further to the north, 3 Troop were simultaneously engaged in support of 2 Para who, learning from their victory at Goose Green/Darwin, were determined to ensure maximum fire support



Two Panhard armoured cars were among the war trophies captured by the Blues and Royals.

from artillery, naval gunfire support and *Scorpions* and *Scimitars* for their attack on Wireless Ridge. At 2030 hours, the first company moved to take its objective supported by 3 Troop. As in all these night actions, the CVR passive night sights proved to be an essential tool for locating enemy positions. They were described by one battalion commander as the eyes of his battalion.

At this point in the battle one of the *Scimitar* commanders was knocked unconscious. By good fortune, an officer of the Blues and Royals, a member of the brigade staff, was nearby and quickly took command of the vehicle. The troop moved forward, against a background of flares and flying tracer, to new positions from which to support the main attack on Wireless Ridge. It was here that a gunnery technique known as "Zapping" was put to good use. The CVR crew would engage the Argentine position with a brief burst of machinegun fire provoking a response, which was promptly silenced by the maingun. The 30-mm Rarden cannon, with its high velocity and great accuracy, was much favoured for this technique. Few Argentines felt able to reply after being "Zapped." The CRV in their turn were engaged by .50 calibre machineguns firing armour-piercing ammunition and by 20-mm air defense guns firing in the ground role but no hits on a CVR were recorded.

The commanding officer of 2 Para reported that the suppressive fire provided by the Blues and Royals during the final phase of clearing Wireless Ridge was accurate and every effective. 3 Troop had by now moved onto the

newly-taken eastern end of a ridge overlooking Port Stanley. The end was in sight. The final assault on the centre sector of Wireless Ridge took place against two enemy companies. As the paratroopers closed with them, the enemy broke and ran, harassed on their way by machinegun fire from the Blues and Royals. 2 Para were now in a dominating position overlooking Port Stanley and its approaches. The battalion commander pressed brigade headquarters for permission to move on Port Stanley as the enemy resistance crumbled. The brigade commander authorized the advance at 1300 hours. Covered by the guns of the Blues and Royals on the high ground, 2 Para moved swiftly along the road to Port Stanley. As the paratroopers approached the outskirts of the town, the *Scorpions* and *Scimitars*, together with 2 Para, were among the first to enter the town. There, in the outskirts, they were ordered to halt while the delicate negotiations for the Argentine surrender were made. At 1600 hours, a cease fire was agreed on and at 2100 local time on 14 June the Argentine commander formally surrendered all his forces. In the words of the British Task Force Commander, Major General Moore, "... the Falkland Islands were once more under the government desired by their inhabitants"

In the inevitable anticlimax, the crews of 3 Troop true to their tradition found comfortable accommodation in Stanley. They were joined there later by 4 Troop from Fitzroy to go aboard *HMS Fearless* for the return to the United Kingdom. Among their

trophies of war were two *Panhard* armoured cars. The mine-damaged *Scorpion* was recovered by *Chinook* helicopter and shipped back home for examination. The crews of the damaged CVR were later to remark that they would be quite happy to go back to war in a *Scorpion*.

The Falkland campaign was notable for its coordination of sea, land, and air power over vast distances, each component of the force playing an essential part. In the land battle, the importance of reconnaissance, simple plans, and coordination of the all-arms battle were all lessons relearned. If any single arm might be singled out for its part in these battles, it is the foot soldiers for their endurance, courage, and skill in extreme conditions. The crews of the Blues and Royals, with their trusty *Scorpions* and *Scimitars*, could feel nevertheless that the part they had played in the liberation of the Falklands was a battle well fought and one which could take its rightful place in the traditions of their Regiment.



LIEUTENANT COLONEL ANDREW R. JONES, Royal Tank Regiment, was commissioned from Sandhurst, the Royal Military Academy, in 1959 and served in Hong Kong and Germany until 1963. Later, he served as a helicopter pilot and air troop commander in Aden, South Arabia, and as an air squadron commander in Germany. He attended the Army Staff College in 1971 and became a staff officer in the Headquarters, Director of Army Aviation in 1972. From 1974 to 1975 he served as reconnaissance squadron leader in Northern Ireland and Hong Kong. As a staff officer attached to Director General of Intelligence and Security, he served in Ottawa, Canada and later as staff officer, Ministry of Defence, London. In 1980 he became the British Liaison Officer to the USAARMC, Fort Knox.



The 2d Cavalry's Texas Campaigns

by Major Victor F. Fryinger

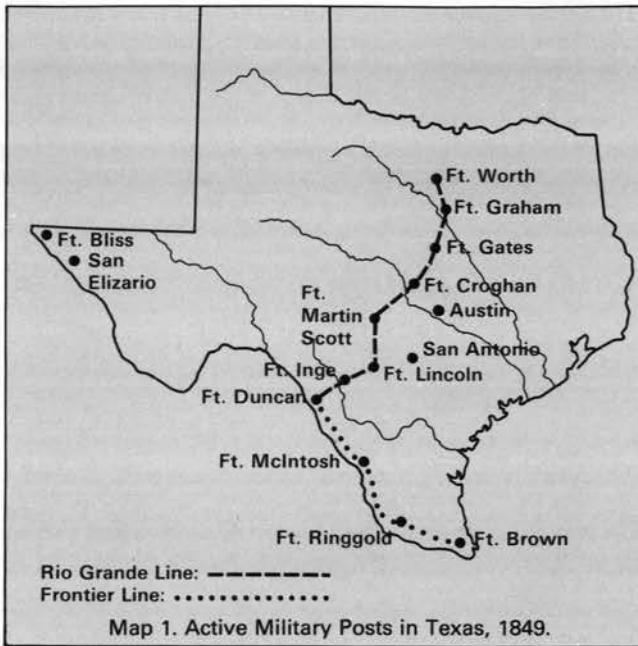
Indian attacks in Texas in 1855 were reaching epic proportions. The frontier had pushed past the thin and sparsely garrisoned line of forts set up to protect it, and Congress acted to protect the settlers. On 3 March 1855, Public Law 70 created two new cavalry regiments and two additional regiments of infantry, marking the first time that the U.S. had ever had two cavalry regiments authorized at the same time during peacetime.

Secretary of War, Jefferson Davis, proceeded to pick, without regard to seniority, the best officers he could find to command and staff the regiments. The noncommissioned officers were carefully chosen from other units, and only outstanding enlisted men were selected or recruited to man the units. The regiments were also equipped with the best horses available, and each company was mounted on a single breed. The weapons were the finest in service: breech-loading carbines, Colt Navy revolvers, and sabers.

The 2d Cavalry Regiment, which soon became known as "Jeff

Davis' Own," was formed in the spring of 1855 at Jefferson Barracks, MO. The regimental commander was Colonel Albert Sidney Johnston, a former general in the Texas Army and a future general in the Confederate Army. His second-in-command was Lieutenant Colonel Robert Edward Lee, who would later command the Army of Northern Virginia.

The 2d remained at Jefferson Barracks until it was assigned to the Department of Texas in October 1855, when it departed for Fort Belknap, Texas with 750 men and 800 horses, divided into ten companies and a regimental headquarters. At Fort Belknap, on the Brazos River just northeast of the present-day city of Graham, Colonel Johnston received orders from the commander of the Eighth Military Department (Texas), Major General Persifor F. Smith, to help guard the frontier against the Comanche Indians. The unit was to garrison forts along the expanding Texas frontier. Colonel Johnston was also directed to occupy previously abandoned Fort Mason, and to establish



Map 1. Active Military Posts in Texas, 1849.

a new outpost on the Clear Fork of the Brazos River, approximately 40 miles southwest of Fort Belknap.

The instructions Colonel Johnston received for defending the rapidly expanding Texas frontier were part of an overall strategy known as the "Smith Plan." General Smith had constructed a double line of forts along the frontier. He proposed to station the cavalry unit in the second line behind the actual frontier where forage would be more plentiful. The forward line of posts were beyond the actual frontier and were manned by infantry units. They were to detect the Indian raiding parties, allow them to pass their forward line, and notify the cavalry to intercept the Indians before they reached the settlements. The infantry would then seal off the frontier to prevent any escape.

The new post on the Clear Fork of the Brazos River had a twofold mission. In addition to guarding the frontier, the post would also guard some 300 Indians living on a nearby reservation.

At Fort Belknap, Colonel Johnston divided his regiment in accordance with his orders and sent two squadrons (Companies A, E, F, and K) to the Clear Fork of the Brazos to establish a new outpost. The men lived in tents throughout the winter, and many of the horses died of exposure. This new outpost was established on 2 January 1856 and named Camp Cooper. On 25 March, Johnston assigned LTC Robert E. Lee to command the part of the regiment stationed at Camp Cooper. Lee assumed command on 9 April.

On 2 January 1856, the same day Camp Cooper was established, regimental headquarters and the remaining six cavalry companies left Fort Belknap for Fort Mason. Having been abandoned several years before, Fort Mason was in poor shape and local settlers had stripped the post of anything of value. Johnston bivouacked his troops in tents and put them to work rebuilding the post which was not completed until early spring. Johnston also ordered his regiment to begin offensive operations against the Indians as soon as weather permitted. On 14 February, the 2d Cavalry had its first engagement. Part of Company C left Fort Mason to pursue a band of Huaco Indians reported to have been stealing horses and scalping settlers southwest of Fort Mason. The unit picked up the Indians' trail and followed it for several days before catching up with them on 22 February. The Indians were defeated and two soldiers were wounded.

In addition to command of his regiment, Colonel Johnston assumed command of the Military Department of Texas on 1 April 1856. He was now in a position to deal with the Indians pretty much as he saw fit and his regiment provided him the means with which to do so. As a former Army general of the Republic of Texas and as an Army paymaster, Johnston had had ample opportunity to study the Indian

problem and to observe the weaknesses of the defensive Smith Plan. Therefore, he decided on an offensive policy designed to carry the war to the Indians.

Colonel Johnston ordered all posts to conduct extensive scouting operations to track the Indians operating along the frontier. He also dispatched several expeditions deep into Indian territory with orders to pursue and attack the Indians with vigor.

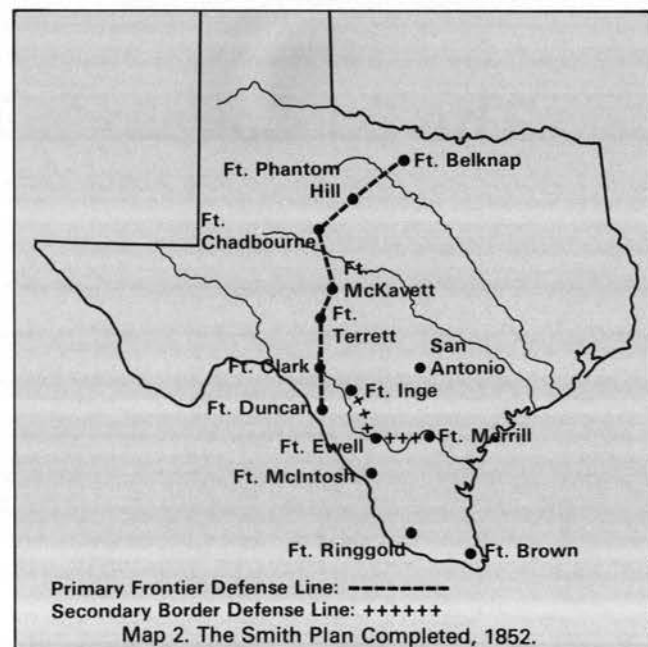
To enhance the protection of the frontier settlements, Colonel Johnston deployed the 2d Cavalry to six posts: The first squadron (Companies A and F) established a camp midway between Forts Mason and Belknap on a crossing of the Colorado River. The second squadron (Companies B and G) remained at Fort Mason. The third squadron (C and I) was stationed at Fort Clark. The fourth Squadron was divided, with Company D stationed at Camp Verde (northwest of San Antonio) and Company H stationed at a crossing of the Sabinal River on the El Paso Road. The fifth squadron (E and K) remained at Camp Cooper. The companies of the regiment were widely separated, trying to cover as much territory as possible.

Although the initial efforts of the 2d Cavalry Regiment had not produced any overwhelming victories, by the middle of the summer, the frontier was relatively free of Indian troubles as a result of the emphasis on long range patrolling and scouting. A friend told Colonel Johnston that the people of Texas now knew that everything possible was being done to guard against Indian attacks. The Indians had, in fact, just withdrawn to gain strength for renewed attacks upon the frontier.

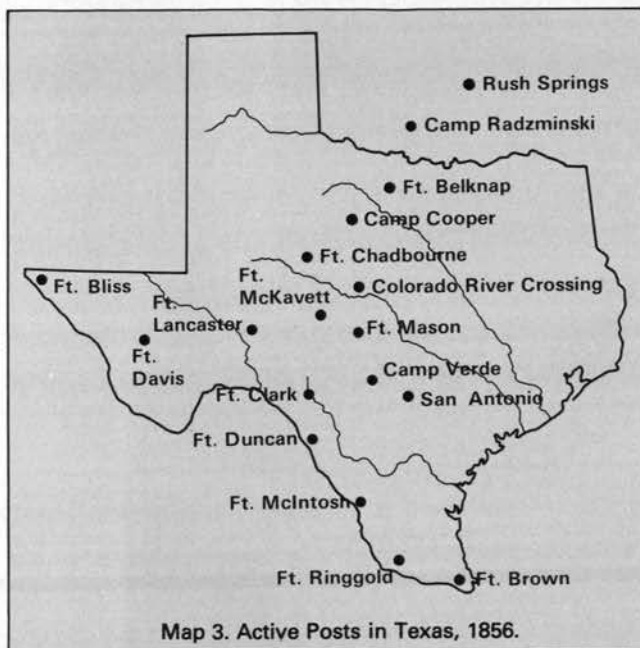
On 18 May 1857, Brevet Major General David E. Twiggs relieved Colonel Johnston as commander of the Department of Texas and Johnston resumed full-time duties as regimental commander, but served for only 3 months before being ordered to Washington. Johnston passed command of the regiment to Colonel Lee on 28 July 1857. On 21 October, Lee asked for, and was granted, a leave of absence, and turned the regiment over to Major George H. Thomas.

Meanwhile, the regiment had been ordered to assemble at Fort Leavenworth on the way to Utah. All of the companies had assembled at Fort Belknap awaiting a supply train when the orders were rescinded and the 2d Cavalry was ordered to remain in Texas. Four companies (A, F, H, and K) remained at Fort Belknap and the others returned to their outposts as a sizeable increase in the number of Indian attacks in 1858 led General Twiggs to order an even more aggressive Army policy, one emphasizing deep attack.

General Twiggs secured permission to send the 2d Cavalry into the Indian territory to the north and Major Thomas led the expedition. The four companies at Fort Belknap proceeded on yet another expedi-



Map 2. The Smith Plan Completed, 1852.



Map 3. Active Posts in Texas, 1856.

tion under the command of Brevet Major Earl Van Dorn. This force, later known as the "Wichita Expedition," left Fort Belknap on 15 September 1858. On 29 September, scouts led by Lawrence Sullivan Ross located a large group of Comanches near what is now the town of Rush Springs, Oklahoma, and attacked at daybreak on 1 October. A 2-hour battle ensued and Van Dorn's forces killed 56 warriors, captured 300 horses, and burned 120 lodges.

The Cavalry suffered five killed, and Ross and Van Dorn were among the 11 wounded. The expedition returned to Texas and discovered that officials in the Department of the West had concluded a peace treaty with the Comanches in August, well before Van Dorn's attack in October. However, Van Dorn was not at fault, and he received extensive praise from General Winfield Scott as well as General Twiggs. Although the battle at Rush Springs was the most complete victory ever achieved over the Comanches, the frontier of Texas was still subjected to frequent attacks throughout the rest of 1858.

A series of expeditions were launched during the remainder of the year and the efforts of the 2d Cavalry further built up the settler's confidence in the Army; and, more importantly, the Indians began to fear the Cavalry as they had never before feared other soldiers of the regular Army because of the Cavalry's attacks against objectives deep in the Indian's rear areas.

In April 1859, General Twiggs ordered the 2d Cavalry to undertake another expedition against the Indians. Major Van Dorn who had recovered from his wounds, elected to command the six companies of the regiment (A, B, C, F, G, and H) detailed for the expedition. Van Dorn moved out of Camp Radzminski (located near present-day Frederic, Oklahoma) and on 13 May 1859, near Small Creek, his command managed to bottle up 91 Indians in a ravine. The Comanches knew they were trapped and fought desperately. Not one Comanche escaped from the battle. Van Dorn's forces killed 50 and captured 41. They also captured 100 horses. Van Dorn's losses were two killed and 13 wounded. Burdened with wounded and prisoners, Van Dorn had to call off the expedition and return to Camp Radzminski. Again, Major Van Dorn and his command received official compliments for their victory.

The next mission assigned to the 2d Cavalry was a complete change-around, for it was ordered to *protect the Indians from the settlers!* Many Indians were adapting to reservation life, but by the late 1850's, the settlers had built up a lot of resentment and there was widespread suspicion that reservation Indians were sneaking out to attack settlers and then returning to the safety of the reservation. In May 1859, a force of about 400 settlers, or at least men claiming to be

settlers, moved against the Brazos Indian Reservation. Only resolute action by the Federal troops stationed there prevented a slaughter of the friendly Indians.

On 3 June 1859, Major Thomas moved four companies from Camp Radzminski and assigned them to the Brazos Indian Reservation where they remained until August. When new reservations on the Washita River in Oklahoma were secured, Major Thomas provided the Indians with an escort to their new reservations.

Most of 1860 and early 1861 passed quietly for the regiment, but the spring brought grave concern over the fate of the nation. By 1 February 1861, six states, including Texas, had seceded from the Union. As news reached them of secession by various southern states, the officers and men of the regiment wondered what would happen and what to do.

In small groups led by company-grade officers, the 2d Cavalry began to move out of Texas rather than remain and become prisoners of war. It is indicative of the respect and admiration held for the 2d Cavalry and other Union forces in Texas that, after the state's secession, many newspapers appealed to the governor to prevent any clash between the state forces and the departing regulars. One editorial noted: "The regular Army had made, with its blood, many places within the State holy and almost classic ground, and that black indeed would be the pages in Texas history, which should have to record such contests."

Even as the departure order was being put into effect the 2d Cavalry continued to perform its duty along the frontier. In mid-February, a detachment from Company C pursued a group of Comanches so vigorously that they fled to Mexico to seek refuge. A bitter biographer wrote: "Thus to the very last hour the regiment discharged its duty to the State, even when the citizens had renounced the flag of their country."

The 2d Cavalry compiled an impressive record during its tour of duty in Texas. It was involved in 40 major engagements, as well as numerous patrols, escort missions, and other duties. The two major victories achieved under Van Dorn (Wichita Village and Small Creek) were referred to by the Chief of Cavalry, Major General J. K. Herr, as "The most decisive victories gained to that time over those Comanches of the southwest." The regiment suffered a total of 13 killed and 58 wounded while defending the Texas frontier.

The tasks given to the regiment in Texas were perfectly suited to cavalry. It was asked to defend the frontier against a mounted enemy, and it succeeded where dismounted troops had failed. When allowed to operate on the offensive, however, the regiment did what no one else had been able to do: namely, carry the war to the enemy by striking deep and often. Its success also served to maintain a good relationship with the citizens of Texas and to keep morale high within the regiment. The small number of casualties and the high percentage of these casualties among the officers indicate that the regiment was well and bravely led. Although it would be improper to give the 2d Cavalry all of the credit for defending the Texas frontier, it is obvious from the examination of the record that the regiment was the most effective instrument of frontier defense in Texas between 1856 and 1861.

MAJOR VICTOR F. FRYSSINGER was commis-

sioned in infantry from Texas A&M University and holds a master's degree in history. He is a graduate of the Command and General Staff College and the Armed Forces Staff College. He served as a company commander in the 2d Armored and the 25th Infantry Divisions and is currently assigned to the military personnel office of the Defense Communications Agency.





Table VIII Needs To Be Improved

by Major Linwood E. Blackburn

Table VIII, the tank crew qualification course (figure 1), is a questionable measure of tank crew proficiency. But before Table VIII can be discussed and recommendations made for its improvement, tank crew battlefield proficiency must be defined.

Crew proficiency involves those skills that the crew must possess to contribute to the lethality of their platoon and to remain alive on the battlefield. The major skills include target acquisition, target identification, marksmanship, tactics, mobility, and use of terrain.

Target acquisition on Table VIII consists of either the tank crew evaluator (TCE) orally designating the target to the tank commander (TC), or the target being marked by the detonation of a gunfire simulation device. The only target identification process for the tank crew is one of distinguishing between various Threat vehicles (*T-72*, *BMP*, etc.) to determine which weapon system to use. This acquisition process is made somewhat more realistic by pop-up targets, and targets that come into view as the tank negotiates the

course. Although realism is enhanced by the variety of presentation, the basic concepts of target identification and acquisition are not tested. Crews do not have to distinguish between friendly and enemy vehicles, nor does their survival depend on their ability to acquire enemy targets.

Crew marksmanship is measured by hits or misses on a main gun target and by area coverage on machinegun targets. Area coverage for machineguns is subjectively determined by the TCE. If ten troop targets are presented and the TCE determines that eight were engaged, then area coverage of 4/5ths will be awarded. For the main gun engagements to measure crew proficiency in marksmanship, the target must be presented within the range capability of the weapon system. Targets should not be positioned at ranges at which a crew does not have a reasonable chance of hitting the target with at least one of the rounds allocated for that task (for the purposes of this article a "reasonable chance" is defined as a 75 percent probability of hitting the target with at least one of the rounds fired at it). If targets are

positioned at ranges at which luck rather than skill, is measured (if probability of hitting the target is less than 50 percent with at least one of the rounds fired), then crew proficiency is not measured.

Table VIII specifies a range band for each of the nine tasks and task 10 is an ammunition conservation task. Crews are awarded bonus points for firing less than the allocated number of main gun rounds. The danger in the inclusion of this ammunition conservation task is that lucky crews will be rewarded. An example would be Task 2, which allocates four rounds to engage two moving tanks at ranges from 1,200 to 1,600 meters. Assuming that the probability of hitting one of the moving targets with at least one of the two rounds is 60 percent, then the probability of hitting with any individual round is 37 percent. Any crew that hits a moving target (with a 37 percent probability of a hit) with one round is lucky rather than skilled, and additionally the crew is awarded bonus points in the form of additional points for ammunition conserved. Extreme care must be taken when incorporating target hits with ammunition conservation to ensure that the condition just described does not occur. The solution is to give the crew sufficient rounds so that if they hit the target it is skill rather than luck, or to reduce the range to the target to achieve the same effect.

Tanks crews negotiating Table VIII should be asked to perform the types of tactics that they would be expected to perform on the battlefield. The two tactics a tank crew would most expect to use are defend and attack. In the defense, a tank crew would expect to see multiple Threat targets moving toward their position (stationary firer—moving target engagements). Initial engagements would be at long ranges with increasingly shorter range engagements as the Threat approaches the defensive position. The problem for the attacking tank is exactly the opposite. He would expect to engage Threat targets in hull defilade positions as he assaults a Threat defensive position (moving firer—stationary target engagements).

Of the four main gun tasks performed during the day on the current Table VIII, one is a moving firer-stationary target type engagement (task 1) with targets in hull defilade positions. Two tasks, 4 and 5, are stationary firer—stationary target engagements that do not directly relate to either of the expected crew tasks previously discussed. Task 4 is a multiple engagement, but the targets are not moving toward the firing tank. Task 5 is also a multiple engagement, but again the targets and firer are stationary. In addition, two of the targets are in hull defilade suggesting that the firing tank should be assaulting, rather than stationary. Task 2 is a stationary firer—moving target engagement with multiple targets. Unfortunately, all ranges are currently configured with targets crossing in front of the firing tank rather than moving toward his position, a tactic one would not expect to see on the battlefield. The other two tasks during the day are multiple-target, machinegun engagements.

For the three tasks at night, two are main gun engagements and one is a machinegun engagement. Task 7 calls for engaging multiple main gun targets (stationary firer—stationary target). Task 9 involves a moving target, crossing in front of the firer, and another stationary firer—stationary target type engagement.

Clearly, many of the tasks specified on the current Table VIII do not simulate any of the expected tasks for a tank crew on the modern battlefield. If the tasks tested do not involve the necessary battlefield skills, then the measurement of a crew's performance while negotiating the course cannot be one of battlefield proficiency.

Table VIII incorporates tactical use of terrain and mobility in the sense that tanks must negotiate a "course road", seek

TABLE VIII A								
TASK	CONDITIONS		STANDARDS					
	TARGET SITUATION	AMMO	ALL TARGETS HIT SUPPRESSED		MACHINEGUN COVERAGE (INF SGG)	TIME	RATING	
1. Engage a stationary tank with main gun.	Stationary tank, hull-down, 1,400-1,600m. Stabilized mode.	2 TPDS-T	YES	NO		0-11 sec 12-16 sec 17 + sec	D O U	
2. Engage multiple moving tanks with main gun.	2 moving tanks, 1,200-1,600m. NBC environment, hatches closed.	4 TPDS-T	YES	NO		0-18 sec 19-30 sec 31 + sec	D O U	
3. Engage infantry squad and truck simultaneously with machineguns.	Infantry squad, 600-800m. 1 moving truck, 900-1,100m.	100 COAX 50 Cal 50	YES	NO	1/2 + 1/4 + -1/4	0-12 sec 13-30 sec 31 +	D O U	
4. Engage multiple stationary tanks and ATGM team simultaneously.	2 tanks, 1,800-2,000m. 1 ATGM team, 1,000-1,200m.	4 TPDS-T 50 Cal 50	YES	NO		0-28 sec 29-40 sec 41 + sec	D O U	
5. Engage multiple stationary tanks with main gun.	3 tanks (2 hull-down), 800-1,100m.	5 HEAT-TP-T	YES	NO		0-26 sec 29-40 sec 41 + sec	D O U	
6. Engage RPG team, ATGM team, and infantry squad simultaneously with machineguns.	RPG team, 200-400m. ATGM team, 700-900m. Infantry squad, 1,200-1,500m.	100 COAX 100 Cal 50	YES	NO	1/2 + 1/4 + -1/4	0-18 sec 19-40 sec 41 +	D O U	
TABLE VIII B								
7. Employ range card lay to direct fire to engage multiple tanks. Simultaneously engage infantry squad.	2 tanks, (1 hull-down), 800-1,000m. Infantry squad, 800-1,000m. NBC environment, hatches closed. PassiveIR.	4 HEAT-TP-T 50 Cal 50	YES	NO	1/2 + 1/4 + -1/4	0-23 sec 24-40 sec 41 + sec	D O U	
8. Engage infantry squad and ATGM team simultaneously with machine-guns.	Infantry squad, 600-800m. ATGM team, 800-1,000m. PassiveIR.	100 COAX 50 Cal 50	YES	NO	1/2 + 1/4 + -1/4	0-12 sec 13-30 sec 31 + sec	D O U	
9. Engage multiple stationary and moving tanks with main gun.	1 stationary tank, 1,200-1,400m. 1 moving tank 1,200-1,600m. Flare illumination.	4 TPDS-T	Yes	NO		0-18 sec 19-40 sec 41 + sec	D O U	
10. Conserve ammo.					8 rounds conserved 6 or 7 rounds conserved 5 or fewer rounds conserved		D O U	

Figure 1.

defilade where feasible, and engage targets on the move. What is not adequately included is the use of terrain and mobility in a defensive position.

A friendly tank in a defensive position will see many Threat targets at about the same time and will have to engage them while avoiding fatal Threat fire. Logically, he would engage one or, at most, two targets from one defilade position and then relocate to another, pre-selected, defilade position. At each position he would have to reinitiate the target acquisition process to engage the remaining Threat targets. Additionally, other Threat targets might present themselves based on the different lines of sight the friendly tank would have from these subsequent positions. This type of mobility and use of terrain is not currently acquired on Table VIII.

From this discussion, it may be concluded that Table VIII

is an inadequate measure of crew battlefield proficiency. This conclusion is based on the following:

- Target acquisition is not adequately incorporated into the tasks the crew are asked to perform.
- Based on range to the target, marksmanship may be as much a measure of crew luck as a measure of crew skill.
- Crews are not asked to perform the types of tasks that they would be expected to perform on the battlefield.
- Proper use of terrain and mobility, at least in the defense, is not properly stressed.

To include the suggested changes in the current Table VIII is not a simple matter. Before incorporating any changes, the following question must be answered: should Table VIII be a measure of crew marksmanship, or should it measure crew battlefield proficiency? If the answer is marksmanship, then the current Table VIII may be a sufficient framework on which to base the modifications. At a minimum, the areas that need to be concentrated on are the ranges at which targets are presented, and the methods by which individual targets are engaged. This will entail a minianalysis of each

"The crews should be presented with the kinds of targets in this phase that they would realistically expect to see: fully exposed tanks and BMPs moving toward the crew's position."

task in the current Table VIII. An examination must be made of the probability of hit curves for each type of tank to insure that the target is located in a range band that affords each crew a 75 percent probability of a hit with at least one of the rounds fired at it. Additionally, two types of engagements must be stressed: moving firer-stationary target and stationary firer-moving target. This type of analysis and the eventual implementation of the results would substantially improve the crew marksmanship aspects of the Table VIII, but would do nothing to improve the measure of crew battlefield proficiency.

For Table VIII to measure crew battlefield proficiency the crews must be asked to perform the tasks that they would be expected to perform on the battlefield. To do this, Table VIII, as tankers have known it since World War II, would be substantially modified.

Target acquisition and identification would be the first area modified. The time-honored tradition of the TCE alerting the crew with "your next engagement will be" should disappear. Target acquisition should follow the following scenario:

- All members of the crew search their assigned sectors,
- A target is acquired by one of the crew members,
- The tank commander makes the determination if the target is friendly or enemy,
- Should the target be enemy, or if there are multiple targets, the commander must make a determination as to the magnitude of the threat (a T-72 at 3,500 meters is not a substantial threat, while a BMP at 2,000 meters is).
- Targets must be engaged in the order of threat that they present to the crew. With the target acquisition process just discussed, it is obvious that the time lines used in the current Table VIII are unrealistic. New time lines would have to be developed, concentrating on determining what are reasonable times for a tank crew to accomplish the five tasks above.

Not only should the target acquisition process be changed, but the physical layout of Table VIII should be modified. The course road currently used should be abandoned in favor of an assault and defense phase. In the assault phase, crews would be required to employ tactical movement toward an objective. Areas that should be graded include style of movement across open terrain, duration of exposure to

enemy fire, and selection of defilade firing positions should the crew be required to halt. Implicit in the assault is the fact that the crew should be buttoned up and in all probability wearing chemical protective clothing and protective masks. All of the targets presented in this phase should be in hull defilade, with the new crew using the target acquisition process described above. The crew would make the determination when to engage the BMPs and when to engage the tanks (at what range does ATGM fire become less of a threat than tank main gun fire?) Any machinegun engagements would be at relatively short ranges and consist of tank hunter/killer teams and troops in the open. The completion of the assault phase should signal the start of the defensive phase; when the crew is on the objective.

The defensive phase should begin with the selection of primary and alternate firing positions and the occupation of a suitable hull defilade firing position. This phase should include the requirement for the crews to distinguish between friendly and Threat vehicles, and to be required to make the decision not to engage friendly targets. One would expect this type of decision to be necessary by crews occupying the Main Battle Area with covering force elements to their front. Once crews have determined the targets to be unfriendly, they must go through the same decision process as in the assault phase—determining which targets are the most dangerous and engaging them accordingly. Once targets have been engaged from the primary position, scoring procedures should deduct points from crews that fail to move to alternate firing positions.

Once movement has been made to the alternate positions, crews must initiate a re-acquisition process and time lines adjusted accordingly to provide for this. The crews should be presented with the kinds of targets in this phase that they would realistically expect to see: fully exposed tanks and BMPs moving towards the crew's position. As with the assault phase, targets must be presented at a range at which crew skill, not luck, will be evaluated. The final evaluation point of this phase would be the tank commander's decision to remain in the position or to request permission to withdraw to a subsequent position in the face of overwhelming odds. These odds should be determined by the success with which the crew had succeeded in destroying the targets presented to them.

I realize that range and ammunition constraints may limit the ability to immediately include all of the recommended changes. However, to be an effective measure of battlefield proficiency, the changes discussed in this paper must be incorporated into Table VIII. Until this is done, Table VIII cannot adequately aid a commander in determining the battlefield proficiency of the crews that he has trained.

MAJOR LINWOOD E. BLACKBURN

is a 1969 graduate of USMA. He has served in cavalry and armor units in Vietnam, CONUS and in Germany. He holds a master's degree in industrial engineering and operations research from Virginia Polytechnic Institute and he is a graduate of the British Army Long Armour Infantry Course and the Command and General Staff School. Currently, he is XO of the 3d battalion, 67th Armor, 2d Armored Division at Ft. Hood, Texas.





Defending the TOC

by Captain Douglas R. Boulter

The tactical operations center (TOC) is the heart of command and control for the combat elements of a brigade or battalion. The headquarters commandant, or adjutant, is responsible for finding a suitable site and moving the TOC into position. It is not an easy task. The pressures of finding a site that will meet the requirements of all staff members, of trying to get all of the TOC elements to the site, and of trying to support the TOC, once it is in place, often obscure the equally vital need to protect and defend it.

The TOC is a prime target for enemy attack and the loss of a TOC will seriously disrupt the battalion or brigade's command and control of the battle. The measures we routinely take to defend the TOC occur because "it has always been done that way," rather than because we are consciously trying to protect the TOC.

A typical scenario of a TOC's destruction could be as follows: An enemy rifle company has been inserted several miles from the TOC and moves to destroy it. Their mission is made easier in that they are guided by the TOC signs at the road intersections. They approach the TOC without being spotted by the sentry who is trying to operate the switchboard while keeping watch. The TOC itself is on the edge of a circular perimeter near the top of the hill, and two enemy rifle platoons maneuver to make a direct assault. On a pre-arranged signal, all of the enemy elements attack. They catch the TOC and attached personnel completely by surprise, preventing them from reaching their fighting positions and resisting. Those personnel not killed are captured. Since a staff meeting was taking place at the time, the enemy takes the brigade commander, four battalion commanders, and the brigade staff prisoner. By the time a reaction force can arrive, the TOC complex is a smoking ruin,

and the enemy have departed with their prisoners.

This is clearly a "worst case," but could easily happen if the proper defensive measures are not taken. The enemy was successful because they easily found the TOC, surprised it, and prevented an effective defense. Such results are clearly preventable.

A TOC's vulnerability depends on whether it can be found by the enemy and, if found, whether it can be successfully attacked.

There are several ways that TOC's can be located: Enemy aircraft may spot the TOC from the air either visually, through aerial photography, through infrared/detecting (IR) or radar. A TOC may also be located by direction finding (triangulating) its radio transmissions. A communications security violation may reveal the TOC's location. Finally, a reconnaissance patrol may find the TOC by accident, or because of poor enforcement of noise and light discipline. Once the TOC is found, it may be attacked by aircraft, missiles, artillery, airborne or heliborne insertions, or by mounted or dismantled elements.

First, we will discuss how to keep the TOC hidden and then we will suggest how to defend it.

Location of the TOC. The enemy knows from our doctrine how far from the forward battle positions we locate our TOC's, and that we often locate on hilltops for good communications. To avoid having the enemy find the TOC through a simple map reconnaissance, we must avoid hilltops because they are not necessary for good communications. Our primary means of communication should be by wire. At a brigade level TOC, this involves the use of high frequency multichannel "shots" which, though line-of-sight, do not have to co-locate with the TOC; they may be wired into

the switchboard from a remote location. Further, since "shots" are directional, they are very difficult to direction-find. We can, therefore, have good wire communication from any location. Our FM radios can always talk to the battle positions using moderately high ground, 292 antennas, retrans when necessary, and reliance on the jump element, or the S-3, both of whom will normally be farther forward than the TOC.

TOC Visual protection. There are several ways in which we can keep the TOC from being spotted from the air. First, we can locate the TOC in a town, conceal the vehicles in buildings, and blend our antennas in with the TV antennas on the roofs of most houses. In Europe, we can use the metal window shades to help maintain noise and light discipline, and we can locate our generators in basements. It is critical, however, that any vehicle not be parked, even temporarily, outside buildings occupied by the TOC.

If the TOC is located in a village which has not been evacuated, enemy agents will report its presence. This problem can be minimized by not letting them know who we are and what we are doing. In a friendly area, civilian police can assist in the TOC's security. And the local populace will probably report suspicious persons.

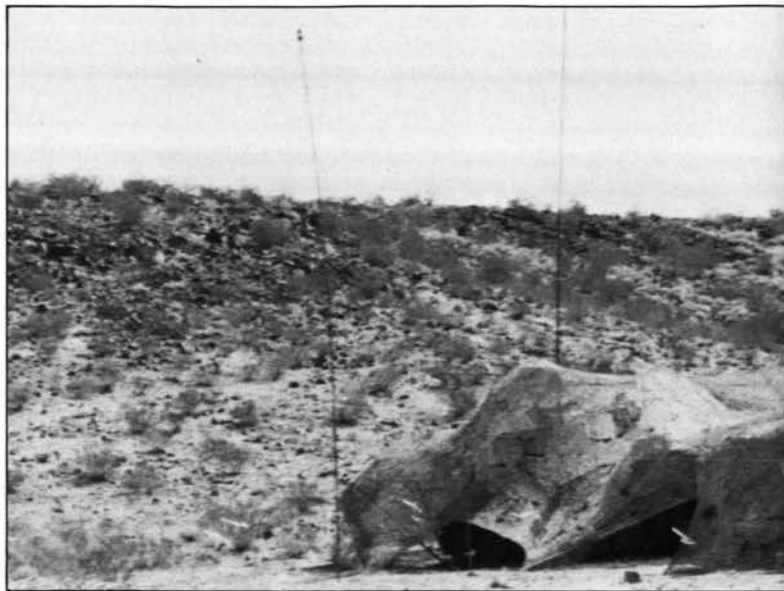
If the TOC is not sited in a built-up area, we must use natural concealment and camouflage nets to keep its position hidden. If the enemy is willing to fly low enough and slow enough, he will be able to spot the nets. Even good aerial photography (excepting infrared), will not enable him to see what is under the nets, and he will not know what he has found. And, if the TOC is well dispersed, which part to attack. Needless to say, we should not make bullseye circles with our TOC vehicles, defensive wire, or positions. It is also very important that tents be camouflaged so that the enemy cannot estimate personnel strength and guesstimate that he has located a TOC.

Noise and light discipline. These are difficult problems in wooded areas, because personnel assume they are always under cover. To prevent light leaks, the vent flaps on the tents must be closed, tent vestibules will help prevent light leaks. Also, the troops should be fed from a GP medium tent rather than a larger kitchen tent, or be fed only during daylight hours. Vehicle & equipment maintenance must be pulled under reduced red light, or under no light. Troops must not use flashlights.

A TOC may be located simply by looking in the most obvious place—high ground. At night, light from the TOC may give it away, generator noise may also pin down the TOC's site. How often have you found a TOC at night by shutting off the jeep's engine, hearing the generators, and going straight to the TOC? Generators are clearly necessary, but power generation should be consolidated so as to operate the minimum number. Generators not mounted in trailers or on the tracked vehicles should be sandbagged to baffle their noise. Trailer-mounted generators should be baffled by the trailer canvas and spotted in thick vegetation which will help to baffle their noise. Vehicle radios should be operated with headphones and the speakers "off" to avoid compromising the TOC's position.

In all cases, we will have to do without the convenience of TOC signs.

Communication discipline. Another way the enemy can locate the TOC is by electronic direction finding. This is probably the TOC's weakest security area, for Americans are not accustomed to maintaining strict radio discipline. A good solution is to minimize radio use and depend, instead, on wire systems, or messengers. If the distance, or the speed of the operation, prevents the laying of wire, most of the FM communications should come from the commanders', or S-3s' jeeps which, since they are highly mobile, prevent accurate



direction finding. TOC radios should be operated on low power settings and the retrans capability used when necessary.

It has often been suggested that the FM radios be removed. This is probably the most difficult solution. Antennas located more than one cable-length away from the radio suffer significant signal loss. If we locate both the vehicle and the radio some distance away from the TOC and use the AN/GRA 39B to remote to the TOC we are immobilizing a wheel or tracked vehicle and removing the protection afforded by that tracked vehicle because it will then be too far away in the event of a ground attack.

The TOC commander must make the ultimate decision, but experience indicates that removing the radios will not be a popular or a workable solution.

If the radio *must* be used at high power, the solution is to keep the transmissions very short. Current training in this area is weak. Our operators send trivial messages, conduct frequent radio checks ("give me a long count"), using the radio-telephone procedure they have been taught to create unnecessarily long transmissions. How often have you heard the set keyed while the operator tries to remember call signs while he or she sends "Whiskey two Zulu tree fower, this is Whiskey two Zulu seven niner, roger out," where "seven niner, roger out" would be much better. We must practice keeping transmissions under three seconds.

A second communications problem involves the radio teletypewriter (RATT) rig. The radioteletype sends through the AN/GRA 106, an AM radio with a very high power output. If the enemy direction-finds this strong signal he will know he has located either a TOC, or a major logistical site. The TOC commander might want to locate the RATT rig well away from his TOC, or to do without hard copy messages all together. Using a directional antenna would help if the rig is sending in only one direction. Unfortunately, there is no low power switch available on the AN/GRA 106. In the end, a RATT rig might have to send all messages while on the move.

TOC defense. If the enemy finds and attacks the TOC, it is imperative to minimize TOC damage/casualties and to inflict maximum damage/casualties on the attacker.

A TOC site can defend against aircraft by putting its air defense assets on nearby high ground with good fields of fire. It can defend against artillery or rockets with counter-battery fire called for by the fire support officer (FSO) (who, being at the TOC, will have a vested interest). Dispersion is a



good defense against air or artillery attack, but is not entirely practical because the more dispersed the TOC, the more difficult it will be to defend against ground attack. The best solution is to dig-in personnel and equipment. Foxholes are the minimum requirement. Engineer equipment from the attached engineers is very useful, but, realistically, barriers and fighting positions for line units will have higher priority than TOC defenses.

Protection against NBC attack requires the use of the chemical agent alarms and mission-oriented protective posture (MOPP). Once the TOC is set up personnel can maintain a high MOPP level. The TOC should work in at least MOPP II, whenever possible.

Protecting against ground attack will be difficult, given the small number of TOC personnel and the fact that they all have critical, battle-related tasks, to perform and are not primarily fighting troops. At battalion-level, TOC personnel will have to protect the TOC complex. A brigade-level TOC will normally have a military police (MP) platoon attached to assist with this task. Protective wire should be laid so as to keep the TOC center out of hand grenade range, roughly 50 meters. Since enough personnel to defend a circle with a 300-meter circumference will not be present, fighting positions will have to be placed well inside the wire. At a brigade TOC, the MP's M60 machineguns should be dismounted and dug in. They will be the heaviest on-site TOC armament available. All TOC personnel must prepare fighting positions and man them at the first sign of danger.

A second perimeter around the living and work areas of the attached elements will have to be manned by the remaining on-site personnel; the communications personnel, maintenance, and attached elements including signal, air defense artillery (ADA), chemical, engineers, etc. Fighting positions must be dug, wire laid on likely avenues of approach, antipersonnel and antiarmor mines laid, and direct fire lanes planned. Even with limited personnel such a perimeter can provide a strong initial defense line which can, if necessary, fall back to reinforce the TOC perimeter.

Finally, if the danger of a dismounted attack on the TOC is high, the commander may use a scout or infantry platoon to man an outer perimeter at least 100 meters beyond the living area perimeter. (A scout platoon will be added to the brigade headquarters company as part of Division 86). Although such a perimeter would spread the platoon too thin for a strong defense, the platoon would be able to provide excellent early warning, allow the employment of long-

range antiarmor weapons, and provide for an early call for indirect fire.

When attacked, the platoon leader will have to immediately assess the situation, notify the TOC, and control the situation to gain time to allow the TOC defense reaction force to arrive. He will have to decide whether to maneuver his elements to flank the attack, or to redeploy all or part of his personnel to the living area perimeter. At no time can any of the perimeters give up 360-degree security, for simultaneous attacks from several directions are probable.

The successful defense of a TOC could occur as follows: An enemy rifle company has been inserted several miles from the TOC and moves on foot to destroy it. They are spotted by an outer perimeter scout who opens fire. They begin to deploy as the scout platoon leader notifies the TOC. The S-3 decides to call for indirect fire and requests assistance from two mechanized platoons of the company tasked to provide the reaction force. At the same time, the forward area support team (FAST) reports a similar attack, and the rest of the reaction company is sent there. The sound of firing has alerted the TOC personnel, and they man the living area and TOC perimeters. One enemy platoon attacks from a different direction, but the Claymore mines and direct fire are too much and their advance is stopped. The Vulcan anti-aircraft guns have been called down from their overwatch position on a nearby hill, and their direct fire is directed on another enemy platoon trying to reinforce the assault platoon which has been pinned down. Meanwhile, the scout platoon leader has maneuvered two of his squads to reinforce the living area perimeter. The HHC commander has taken change of this perimeter, using the internal wire communications to control the action. By now, most of the claymores have been fired and the HHC commander fires a green star cluster to signal the movement back to the TOC perimeter. The artillery fire is adjusted so as to continue to fall on the enemy. The attack stalls. As the HHC commander is organizing a counter-attack, the arrival of the infantry platoons make this unnecessary. They mop up the decimated elements of the enemy, and the TOC resumes normal functioning. Casualties are attended to, and personnel begin rebuilding the defenses.

This time, the defense was successful and depended on: (1) early warning by the outer perimeter; (2) good dug-in fighting positions; (3) good communications; (4) use of all available weapons; (5) preplanning of signals and routes of withdrawal and, (6) trained personnel.

In short, the best defense is to keep the TOC from being found, and, if it is found, its successful defense. We have only to think through our passive and active defense measures and train our soldiers accordingly.

TOC survival is vital and rests on concealment, security, and integrated and coordinated defense measures.

CAPTAIN DOUGLAS R.

BOULTER was commissioned in Armor from Dickinson College in 1973. He served as tank platoon leader, support platoon leader, and brigade S5 with the 1st Brigade, 3d Armored Division, Germany. He attended AOAC and was assigned to Ft. Hood, Texas as Technical Inspection Quality Control Officer, HHC, 2d Brigade 2d Armored Division. He is now assistant professor of Military Science at Duke University, NC.





Vickers Valiant

by Richard M. Ogorkiewicz

Battle tank development programs are generally the prerogative of governments. But there is one notable exception to this in the tanks developed by Vickers, the British engineering company which has produced more than one design on its own initiative. The latest example of this is the *Valiant*, which represents an interesting and important addition to the new generation of battle tanks.

The ability of Vickers to develop a new tank as advanced and effective as the *Valiant* stems from many years of experience in the design and production of tanks. In fact, Vickers' involvement with tanks goes back to WW I. Moreover, Vickers was the world's leader in tank development during the 1920s and early 1930s when they produced several outstanding designs for the British Army and for export. The success of Vickers' designs is best attested by the fact that they were copied in several countries, including the USSR. In particular, the most numerous Soviet tank up to 1941, the

T-26, was a copy of the Vickers-Armstrong *Six-Ton Tank*.

Much more recently, Vickers played a major role in the development and production of the *Centurion*, which has been one of the most successful and most widely used tanks since WW II. Among others, *Centurions* were employed very successfully in the Middle East wars of 1967 and 1973 and with the advantage of various retrofits they are still very effective today—40 years since they were first designed.

Vickers MBTs. From the basis of their experience with the *Centurion*, Vickers began during the late 1950s to design a modern tank of their own. This tank was intended to be as well armed as the *Centurion* and other contemporary tanks. But it was to be lighter, to make it more compatible with the infrastructure of many countries and in particular with their bridging and other transportation facilities.

Vickers' work on this tank attracted the attention of the Indian Army, which backed its development and adopted it



The Chobham-armored Vickers *Valiant* weighs in at 43.6 metric tons, some 10 tons, or more, lighter than the *M1*. The four views show the main gun, armor array, and suspension system.

under the name *Vijayanta*. At first, this tank was built at Vickers' plant in England, but from 1965 on it was produced in India, at a plant built at Adavi, near Madras. Since then, well over one thousand of the Vickers-designed *Vijayantas* have been built at Avadi and they are the Indian Army's main battle tank.

As the production of the *Vijayanta* got underway in India, the production of them in England ceased. However, in 1968, Vickers received an order from Kuwait for 70 tanks which were basically similar to the *Vijayanta* but which were called *Vickers Main Battle Tank Mark 1*.

The production of the *Vickers MBT Mk 1* was followed by the development of the *Mark 3*. This was first ordered in 1977 by Kenya and in 1981 by Nigeria, for which the *Mark 3* is currently being produced at a brand-new plant that has replaced Vickers' earlier production facilities in Newcastle-upon-Tyne in the north of England.

The *Mark 3* has the same 105-mm gun as the *Mark 1* but it is a considerable advance on the latter in several other respects. In particular, it has a Marconi Radar *SFCS 600* fire control system with a laser rangefinder and an electronic computer, a more powerful 720-hp engine produced by Detroit Diesel Allison and a new, cast turret which offers greater protection. In spite of all the improvements, the weight of the *Mark 3* is virtually the same as that of the *Mark 1*. It is, in fact, 38.7 metric tons (85,300 lbs), combat-loaded, which puts it among the lightest of the modern battle tanks.

Chobham armor. The successful development of the *Mark 3* led to the latest Vickers' tank, the *Valiant*. The design of this tank was started in 1977 and its prototype was completed in June, 1979. Since then, it has been tested extensively, not only by Vickers, but also at the Royal Armoured Corps Centre at Bovington Camp, the British equivalent of Fort Knox.

The design of the *Valiant* has been very sensibly based on that of the *Mark 3*, but the two tanks differ very considerably

in all major respects. One of the most important differences is in their armor. The *Mark 3*, like the *M60A1* and other tanks of their generation, has conventional steel armor. The *Valiant*, on the other hand, has special armor. In fact, it has the same kind of Chobham armor as that which served as the basis of the high degree of protection incorporated in the US *M1* tank.

Its special armor makes *Valiant* comparable in terms of protection with the latest tanks developed anywhere in the world. At the same time, it enjoys a very considerable operational advantage over other new tanks with special armor on account of its much lighter weight. Thus, its combat-loaded weight is only 43.6 metric tons (96,000 lbs), which makes it 10 tons, or more, lighter than the *M1* or the *Leopard 2*.

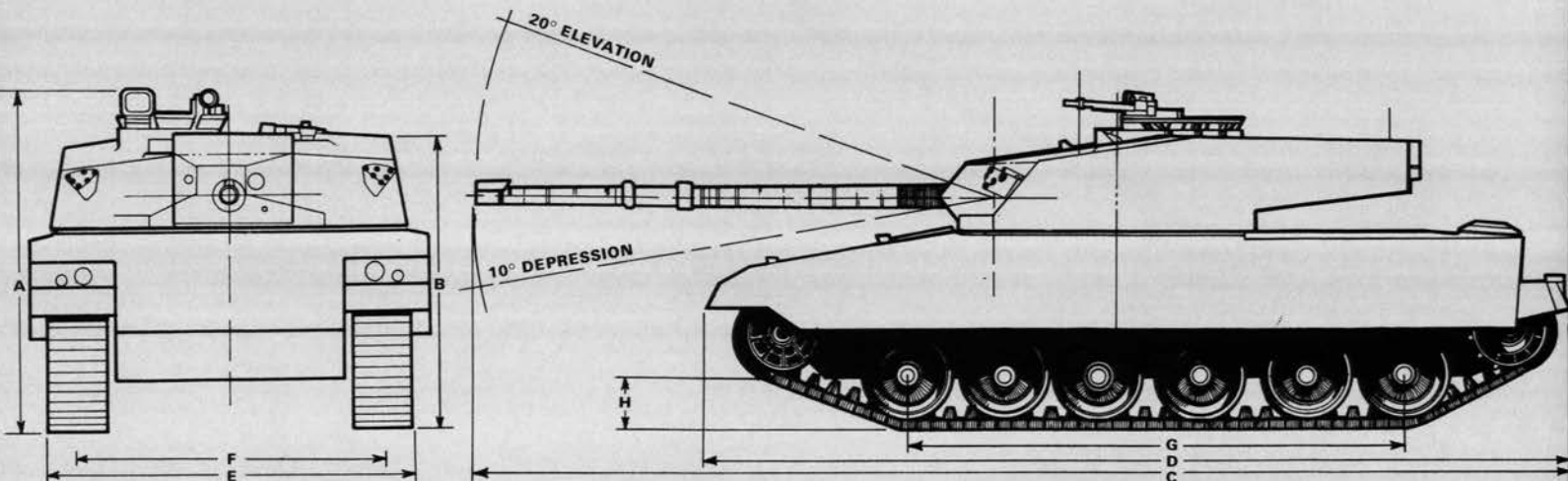
One of the reasons for the relatively light weight of the *Valiant* is that its hull structure is of aluminum armor instead of steel. The weight saving advantages of aluminum armor have been recognized elsewhere, but the *Valiant* is the first battle tank to exploit it, apart from experimental vehicles.

120-mm main gun. Another major feature of the *Valiant* is the design of its "universal" turret, which not only incorporates the special armor, but can mount different 105-mm or 120-mm guns, to suit the user's requirements. At first, its prototype was armed with a 105-mm gun, but in 1982 it was rearmed with the same 120-mm *L-11* rifled gun as that mounted in the *Chieftan* and the new *Challenger* tanks of the British Army. Alternatively, the *Valiant* can be armed with the Rheinmetall-designed 120-mm smoothbore gun which has been adopted for the *M1E1* as well as *Leopard 2*.

The secondary armament of the *Valiant* includes a coaxial 7.62-mm Hughes Chain Gun. This externally-powered weapon has been adopted because of the advantages it offers to the crew, including its ability to eject faulty rounds without a stoppage of the gun and the elimination of gun fumes in the turret.

Like the *Mark 3*, the *Valiant* is fitted with the Marconi Radar *SFCS 600* fire control system. But in addition it has a muzzle reference system which enables the gunner to compensate rapidly for any tube bend that may occur in spite of the gun being fitted with a thermal jacket.

One of the most interesting features of the *Valiant's* armament system is the provision of a panoramic, independently-stabilized sight for the commander and of a telescopic sight for the gunner. This effective and economic arrangement gives the commander the highly important capability to observe from under armor on the move as well



A - Overall height (to top of Commanders Condor sight hood)	3.24 m	E - Overall width (without Applique Armor)	3.3 m
B - Height to turret roof	2.64 m	F - Track Centres	2.7 m
C - Overall length with gun	9.53 m	G - Centres front to rear spring wheel	4.47 m
D - Overall length without gun	7.51 m	H - Ground Clearance	4.57 m

as when the tank is stationary. The commander's stabilized sight is also linked electronically to the gun, which makes it possible for him to engage targets, when appropriate. On the other hand, the gunner's telescopic sight has the advantage of being mounted coaxially with the gun, which eliminates linkage errors between the sight and the gun.

In addition, there is also a panoramic, independently-stabilized thermal imaging sight. This novel sight comes with separate monitors for the commander and the gunner and is available not only for observation, but also for the engagement of targets at night and under various conditions of poor visibility.

Another advance incorporated in the *Valiant* is a new, all-electric, two-axis stabilization system developed by Marconi Radar. In principle, the stabilized gun control system of the *Valiant* is similar to those fitted in the Vickers *Mark 1* and *Mark 3*. However, it is of a much more advanced, solid-state type which is much more efficient and more compact than earlier electric systems. It also has the advantage over hydraulic, or electro-hydraulic, gun control systems of being free not only of the nuisance of hydraulic leaks but also of the potential danger of fires, and it requires no fine filtration of hydraulic fluids or warming-up time under low temperature conditions.

Automotive components. The automotive characteristics of the *Valiant* represent another major advance achieved in its design and make it comparable with the most mobile of the recently developed tanks. For instance, its power-to-weight ratio is 23-hp per metric ton, which is close to the power-to-weight ratio of the *M1*, and its acceleration is similar.

The *Valiant* is powered by a Rolls-Royce V-12 diesel, the *CV12TCA Condor*, virtually the same engine as that fitted in the new British Army *Challenger* tank, but is rated at 1,000 instead of 1,200 hp. The lower power rating should increase its durability and, because it is less highly turbocharged, its response is more rapid, which increases the tank's acceleration. The Rolls-Royce engine is also noted for its low specific fuel consumption, which at its minimum is only 0.34 lb/bhp/hr and which should help to extend the operating range of the *Valiant*.

In contrast to others, the transmission of the *Valiant* does not follow the trend to use torque converters and hydrostatic steering. Instead, it is a modified version of the six-speed transmission produced for the *Chieftan*, but made fully automatic by means of an electric control system. The all-mechanical transmission has the inherent advantage of being more efficient, which means that more of the engine power is available to drive the tank, instead of being dissipated by oil coolers. At the same time, the skill and effort

generally required of drivers by mechanical transmissions are eliminated by the electrical controls.

In addition to reducing driver fatigue, the design of the *Valiant* also provides exceptionally good access into the driver's station. In fact, it is almost the only tank of the new generation with special armor which does not require one to be a contortionist to get into the driver's seat.

The suspension of the *Valiant* is almost the only feature carried over with little change from the *Mark 1* and *Mark 3* tanks. In principle, it is of a conventional, torsion bar type, but it is unique in having secondary torsion bar springs in the trailing arms of the first two and the last road wheels on each side. The secondary torsion bars provide more effective springing at the most critical wheel stations and significantly improve the ride over rough ground.

The secondary torsion bar springs and its other unique features make the *Valiant* an interesting addition to the new generation of tanks. What is more, it is clearly a very potent tank. Yet it should not be costly to produce, because its designers managed to adapt several major components already in production, thereby saving a great deal of development and tooling costs. All this, together with its relatively light weight, makes the *Valiant* a very strong candidate for adoption and it will be interesting to see which army is the first to use it as its battle tank.

RICHARD M. OGORKIEWICZ is a consulting engineer and lectures at the Imperial College of Science and Technology in London.

He has lectured and advised on armored vehicles in many countries, including Brazil, Israel, Japan, Peoples' Republic of China, Republic of Korea, South Africa, Spain, Sweden, and Switzerland, as well as England and the U.S.

In the U.S. he has lectured at TACOM and other U.S. Army installations and participated in the Armored Combat Vehicle Technology Program and combat vehicle studies for the Defense

Advanced Research Projects Agency. He is also the author of two books and numerous articles on armor, this being his 72nd article in *ARMOR*.



Attack Helicopters Are Offensive Weapons

All close combat weapons systems designed since the turn of the century have been developed with three general characteristics: firepower, mobility, and survivability. Each of these systems has been developed to accomplish one military objective: to seize terrain through offensive action.

Horse cavalry first provided mobility and shock to the battlefield and the tank was the first weapons system to accomplish these actions with the addition of firepower and survivability.

But now, another close-combat system has evolved that adds a new dimension to the battlefield—the attack helicopter (AH). It has added a fourth close combat characteristic—vertical, long-range *attack*.

The AH may prove to be the most revolutionary combat system since the tank because its vertical, long-range attack capability will revolutionize ground combat and complement frontline close air warfare.

Yet the defensive scenario for a war in Europe has so conditioned our thinking that we tend to look upon close combat weapons systems, including attack helicopters, primarily in defensive roles.

This thinking persists despite the development of AH doctrine and the intent of AH team operations, which employs attack aircraft as *offensive* assets of the combat arms team.

This misconception often relegates attack helicopter assets to a defensive role in the overall scheme of maneuver, regardless of mission. But, attack helicopters provide the ground commander with a fast, highly mobile weapons systems with a multidimensional firepower capability in the attack as well as defensive role. This capability is provided by the following subsystems:

- An improved 2.75-inch rocket multipurpose submunition (MPSM) that has increased range, accuracy, and lethality over the Vietnam-vintage 2.75-inch rocket provides both antiarmor and antipersonnel capabilities. When integrated with the later versions of the *AH-1S Cobra* and the *AH-64 Apache* rocket subsystems, it can provide nearly point-target accuracy (essential for air defense suppression) at ranges in excess of 6,000 meters.

- A 20-mm (on the *Cobra*) or 30-mm (on the *Apache*) cannon provides the AH with a light armor, air defense, and anti-personnel suppression capability at ranges in excess of 2,500 meters. Additionally, AH cannons have great potential as air-to-air weapons that can be used to deny the enemy's fixed and rotary wing aircraft freedom of maneuver on the forward edge of the battle area.

- An ATGM that provides the capability for both the *AH-1* and *AH-64* to destroy armored targets at ranges exceeding 3,500 and 6,000 meters, respectively. The standoff capability of the ATGM significantly reduces the effectiveness of the enemy's air defense capability, while simultaneously lessening the AH's reliance upon terrain cover.

These weapon system capabilities combined with the flexibility, speed, and mobility of the AH airframe provide a tremendous advantage to combined arms teams operating in any environment.

In the "Airland Battle 2000" concept, the AH team will

participate as a *maneuver* element of the combined arms team. Even though we foresee the initial conventional battle as being defensive in nature, the AH team will be planning and executing offensive operations within the context of the defensive scheme. This may seem a bit farfetched; however, in every air-to-ground scenario the thesis is *attack*. This concept is key to the argument that the AH is an offensive weapon.

While there are various definitions for offensive actions, they all equate to the following: find, disrupt, destroy, and/or deny an enemy force terrain, mobility, or reinforcement. Therefore, no matter what the strategy of the ground commander, the AH team will be required to perform *offensive* operations to accomplish those missions.

In the classical sense, AHs as a maneuver element are not going to "run through" any armored formation. But, with today's technological advancements and the advent of long-range, highly-accurate, direct-fire weapons, the old cavalry charge has given way to using favorable commanding terrain to enhance fire and maneuver in the attack.

During intense, close offensive combat when a penetration or breakthrough occurs, the AH's capability may be initially lessened because, as with every combat maneuver element, there will be some instances where its advantages are diminished by either terrain, weather or the enemy situation. But, one must agree that this by no means limits the AH to defensive roles.

In the case of the covering force, although integral to a defensive posture, the AH's role is offensive; attack the enemy—defeat him! The covering force must be capable of finding, dispersing, attriting, delaying, or destroying the enemy on frontages sometimes exceeding 50 km, to allow the friendly commander time to position his forces at the suspected breakthrough point.

To accomplish these tasks, the covering force must be highly mobile, comprised of long-range weapon systems, and capable of long-distance communication. What better asset could the commander have to meet these requirements than air cavalry and attack helicopters?

Air cavalry units have the capability to screen large areas unobserved, while maintaining continuous communication with the ground commander. Additionally, they have a significant advantage over the ground force in that they are not as terrain-bound. They are less vulnerable during relief operations, and have greater mobility than other covering force assets.

Once the air cavalry locates the enemy forces, well forward of the anticipated line of contact, they can help to favorably develop the situation, employ friendly artillery early, and simultaneously hand off enemy targets to AH units for long-range, direct-fire engagements.

AH teams can attack the enemy well forward of friendly ground forces with 2.75-in MPSM rockets and ATGMs. This will accomplish several tasks for the ground commander; e.g., continue effective artillery employment, strip away enemy reconnaissance elements, force the enemy to deploy from his march formation, and slow him down. With the

advent of high technology, night and adverse-weather sighting systems, the AH is nearly an all-weather, 24-hour performer in this role.

Such attacks will increase the enemy's vulnerability to both direct and indirect fire, and deceive them as to the main battle area's actual location. Considering the capability of the AH to deliver long-range fire forward of the covering force area, it is easy to see the damage that can be levied upon the attacking enemy force.

Therefore, even in the traditional defensive scenario, air cavalry and AHs are not employed defensively. The offensive nature of fire and maneuver, while maintaining freedom of action, infers offensive action and, since this is exactly the way AH assets will be employed against the enemy—it is obvious that they are not purely defensive weapons. The AH uses the principle of the active defense, which ultimately promises offensive action. The active defense of the extended battlefield proposes that the force uses terrain and small unit (battalion-size) offensive actions in depth by trading terrain for the retention of mobility, initiative, and tactical advantage.

The Army is currently developing the deep attack and raid doctrine to further exploit the mobility, flexibility, and firepower of the AH. For the lack of an official term, these activities are referred to as OFF (operations forward of the friendly line of troops). OFF will be initiated with the intent to inflict damage to the enemy's follow-on forces, and is characterized by accurate intelligence, exploitable terrain, and careful planning. (See "Airland Battle's Power Punch," September-October 1982 *ARMOR* and "Airland Battle De-

feat Mechanisms," January-February 1983 *ARMOR*.)

Although the success of OFF relies heavily upon terrain and time (for planning), there will be many opportunities in the airland battle to exploit the maneuver capability of the AH by attacking the enemy's reserves, second (march) echelons, and supply points.

Ideally, where terrain precludes the use of a mechanized force, limits the infantry's advance, and restricts observation, there is an opportunity for OFF. Since the AH team possesses the speed and mobility to exploit terrain, it eliminates an advantage that once belonged to the attacking force. The current AH-1 can successfully attack the enemy to depths of 100 kilometers without overextending its support assets. If terrain and the enemy's disposition permit, the AH team (with minimum support elements) can attack 250+ kilometers in depth. The AH-64, with its increased fuel load and armament capacity, will substantially improve the OFF capability.

The preceding only touches upon the offensive capability/characteristics of the AH team and, as technology improves weapon systems and survivability equipment, the opportunity for offensive diversity will increase.

So, just as with any weapon system, the AH has limitations and constraints, but it is by no means a purely defensive weapon system—the AH is an offensive weapon whether used to defend or attack.

KENNETH R. MCGINTY
Major, Armor
HQDA Washington, DC



No Time to Train?

This article is designed to give tips and techniques for training that will:

- Train the soldier.
- Utilize nonprime training time.
- Require a minimum of equipment and funds.
- Require a minimum of preparation by the chain of command.
- Apply to most types of units and subunits.
- Not infringe on the limited off-duty time of officers, NCOs or privates.

On every training day, two or more men are missing from training because of charge of quarters (CQ) duty, CQ runner, arms room guard and other duties. The result is 2 lost days per man, per month, because the day after such duty is a free day. However, CQ is an extra duty done on duty time and, since sleeping is usually forbidden, there should be no hesitation in using this time for productive training.

The easiest way to recoup this lost time is through enrollment of every junior NCO in the appropriate Army Correspondence Course for his grade and MOS. This should be a matter of company policy. When the CQ reports for duty he should have his course materials with him and nothing else. If he only works on the course between 2400 and 0500 hours while on CQ for an average of 2 week nights and 1 weekend a month, he will have completed 180 hours of course work within 1 year. This is in excess of most correspondence course requirements.

Furthermore, correspondence courses do not detract from routine CQ duties, they are designed to be done in brief periods, and are available for virtually any military subject—and they are free!

There are also other, less obvious, advantages. For instance, passing a correspondence course gives the soldier promotion points.

Supervision of this program is easy and painless. The routine checks on the CQ will verify that he has his materials. Each morning his results can be checked and, as course work is graded and returned, the company commander will receive a copy of the soldier's results from the school.

Reinforcement of this program can come from presentation of course diploma certificates and letters of commendation. The best reinforcement, of course, will be the self-satisfaction of a job well-done.

Later, if the subject is appropriate, the CQ can present a class on the subject to his unit. This will also cut down the class burden on more senior sergeants and officers, and nothing teaches so much as preparing to teach someone else.

Senior NCOs and junior officers who perform duties as battalion staff duty officer/NCO can also use this technique to enhance their careers.

Training the CQ through correspondence courses is an excellent vehicle, but it is only effective for the individual. One method of instructing small groups is the use of training extension course (TEC) lessons.

the battle, classic JAAT concepts can be employed to inflict maximum destruction on the enemy before he gets to the main defensive positions.

We A-10 pilots have some selfish reasons for wanting to get into the covering force fight. The problem of integrating tactical fighters is greatly reduced here compared to the MBA where the ground commander could find himself "up to his elbows in alligators." Furthermore, the enemy will probably be more concentrated with more clearly defined armor formations, therefore target acquisition and the selection of priority targets is easier. This "pre-FEBA" situation is in contrast to the MBA where the fighting may be very intense and the armor formations less "orderly." Additionally, enemy air defenses should be more distinguishable in their doctrinal locations early in the battle.

In the CFA the A-10 pilot has the advantage of working with the cavalry. The cavalry's mission of enemy reconnaissance and identification is similar to the Air Force's forward air controller's. The A-10 should be able to blend well with the cavalry. Additionally, the cavalry uses terminology we are familiar with, which makes coordination easier. While there will be armored cavalry units on the ground, the problem of sorting friendly and enemy forces should be simplified here. Lastly, due to the design of the active defense, the A-10 pilot in the CFA is not normally faced with a situation where the main friendly force is in immediate peril requiring him to engage in "last ditch" operations. For the A-10 pilot, these are all advantages that will make his job of supporting the ground force easier while increasing his effectiveness.

This discussion should not be construed to mean that the only place to employ A-10s is in the CFA. The ground commander should use tactical fighter assets wherever he deems necessary, assuming that they are available. We simply feel that if he requests them early and incorporates the A-10s into the covering force battle, we can optimize the advan-

tages that the A-10 provides. A key point to remember is that the ground commander must ask for those assets; it is his party and we cannot attend unless we are invited.

So what is the conclusion? The A-10 can aid the ground commander. The integration of the A-10 flight is easier if conducted through Army aviation channels, either air cavalry, or attack helicopters. Additionally, the overall effectiveness of the A-10s and helicopters can be enhanced if they are employed together.

In the covering force battle, the ground commander can effectively employ the A-10 with its flexibility and firepower in concert with his cavalry units to disrupt and destroy the enemy as a cohesive fighting force, or at least adversely impact on the enemy's ability to execute his attack plan. In this way, the A-10 flight can help set up the enemy for the "death blow" dealt by the friendly ground forces in the MBA.

The foregoing offers just one brief look at how the A-10 can support the ground commander. There are many other applications and scenarios that could be reviewed. Admittedly, this is one A-10 pilot's perspective. It is important that our ground forces, from the tank gunner to the higher command echelons, understand that in the A-10 they have an aircraft and pilot dedicated solely to the support of the ground battle. We also know that it is the ground battle that will ultimately decide who is the victor or the conquered. We who fly A-10s have an old saying: "You can shoot down all the Migs you want; however, when you return to base, if the lead tank commander of an advancing enemy motorized rifle division is eating lunch in your squadron snackbar, Jack, you just lost the war!"

(This article also appeared in Fighter Weapons, Winter 1982 Ed.)

EDWARD H. HOULE
Captain, USAF
Nellis AFB, NV



Developing The Situation

Organic forward elements are the primary sources of information that enable the battalion commander to see the battlefield. During a movement to contact, or a meeting engagement, this information is obtained by either the scout platoon, or, more often, the lead tank or mechanized teams "developing the situation." There is little specific guidance for what "developing the situation" entails. I will attempt to clarify the term.

TT 71-1/2 *Abrams Battalion* defines "developing the situation" as "the company commander deploying his best situated platoon to learn the enemy's strength, composition, and disposition." It is an implied task for any reconnaissance, movement to contact, meeting engagement, or hasty attack mission the company receives. This action should be completed to the commander's satisfaction before he chooses a course of action in response to the threat (if given enough time to properly develop the situation). This does not translate to the often-seen immediate reinforcement of the first platoon in contact.

The "developing the situation" phase of offensive operations lasts as long as the company or battalion commander deems appropriate, but they must have an understanding as to how much time they can afford to developing the situation.

They can afford 45 minutes for a thorough reconnaissance or only 3 minutes for a report on what is to the immediate front. The battalion commander may indicate how much time a company commander may delay before recommending an attack, defense, or bypass option. More time, of course, will give the platoon in contact the ability to gather more information. If time is critical, the commander may have to choose his option with what information has been obtained thus far, realizing that the less intelligence obtained the greater risk he takes in choosing his course of action.

The platoon leader is the key to developing the situation. He directly controls his element's actions upon contact. First, he deploys and reports contact (the initial spot report), and returns fire. Too often, however, the reporting actions stop here. The next step is to discover and report detailed information on all the following subjects within the company's axis of advance:

- Enemy positions
- Size of enemy force
- Obstacles
- Bypass and concealed routes
- Other commander's EEI/OIR (from OPORD)

The platoon leader must aggressively pursue this

information-gathering objective. At this point, developing the situation is a platoon mission, just as the company's mission may be a "movement to contact." The information is out in front of the platoon leader for the taking—it is up to him to gather it. Only in this way can the company and battalion commanders "see" enough of the battlefield in front of them to make competent tactical decisions. Only platoon leaders trained to accomplish this specific mission will be able to help in properly developing the situation.

The tank or mechanized platoon accomplishes this task through fire and maneuver. It may involve dismounting and using indirect fires. At this stage in the battle, line platoons are more valuable intelligence collectors than the lightly armed and manned scout platoon. If enemy tank or missile fire is too intense, the platoon leader calls for suppressive fires. He uses his tank thermal sight to see through smoke, or maneuvers around smoke screens. If enemy artillery is not being received, dismounting may be the safest way to get a good look at enemy positions. The imagination, aggressiveness, and tactical sense of the platoon leader plays a part in determining the quality and quantity of information gathered. If partially-trained or inexperienced platoon leaders are in this area, the company commander must personally intervene to develop the situation.

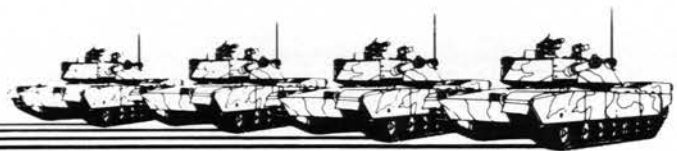
The platoon leader in contact must do his utmost to gather

the information and pass it on to the company commander, who then passes it on to the battalion tactical operations centers (TOC) (with the battalion commander and S2 monitoring). While the company commander is supervising the platoon leader's development of the situation (often by going to the scene himself) and formulating a course of action, the battalion commander, S2, and S3 are analyzing the information received and developing tactical intelligence. This intelligence is then used to formulate the battalion commander's courses of action and is sent to higher headquarters over the brigade intelligence net to keep the brigade commander's S2 informed.

Only one area of the intelligence/tactics interface has been discussed here, but it is one which is the least understood or practiced. Other areas include ground surveillance responsibilities in the defense, patrolling, NBC surveillance, and the reconnaissance in force.

Combat intelligence is a major operation that is habitually downplayed during short-duration peacetime exercises. Yet, it is a very difficult operation from platoon leader to G2 to work well without constant attention. The next battle may not give us the chance to learn from our first mistakes.

CLAIR E. CONZELMAN
First Lieutenant, Armor
HHC, 2-37 Armor



Leadership Challenges

Some time ago the Army adopted eleven leadership principles which have served us well. They are:

- Know yourself and seek self-improvement.
- Be technically and tactically proficient.
- Seek responsibility and take responsibility for your actions.
- Make sound and timely decisions.
- Set the example.
- Know your soldiers and look out for their welfare.
- Keep your soldiers informed.
- Develop a sense of responsibility in your subordinates.
- Ensure that the task is understood, supervised, and accomplished.
- Train your soldiers as a team.
- Employ your unit in accordance with its capabilities.

These leadership principles provide the basis for any level of Army leadership, but their use in training and developing leaders is open to serious discussion. For example, how do we train new lieutenants to "make sound and timely decisions," and what does "set the example" mean to a brigade commander as opposed to a tank commander who may well be an NCO?

The Army War College (AWC) in 1971 confirmed that, "our leadership principles [and the institutional concept they express] are valid and appropriate . . ." That study also confirmed that the successful application of these leadership principles required substantial variations in leader behavior, depending upon his rank or grade and his position in the leadership chain. It is well understood that leadership *tasks* may vary considerably at different levels, but we have not yet widely accepted the idea that leadership *skills* and *behavior* must vary accordingly. We still have too many divi-

sion commanders exercising the leadership behavior that made them successful brigade commanders and too many platoon sergeants acting like tank commanders.

That same AWC study also noted three leader behaviors that are highly correlated to successful performance at any level. They are:

- Communicate effectively with subordinates.
- Set the example for your soldiers, on and off duty.
- Set high standards of performance.

I suggest further that the following categories of leader behavior be given first priority in the leader development area:

- Ensure that subordinate leaders are given the necessary power to successfully lead their units.
- Organizational leaders must chart the future and articulate that vision to their organization.
- Leaders must play an active role in shaping the values of subordinates.

Empowering subordinates. To be an effective leader, one must turn all his followers into leaders of their respective groups. The leader must thoroughly learn that his role is not one of domination over his subordinates, but is to give them strength and make them feel like the originators of ideas. The course of future battles will hinge on small unit leaders taking independent and innovative action. The process is known as "Power Down to Power Up."

However, power is not willy-nilly handed down. Subordinates must first be trained to accept and properly use the power given to them. They must be completely familiar with the standardized practices in the unit and there must be a freeflow of information *up* and *down* the chain so that both senior and subordinate leaders have a clear, jointly agreed

upon understanding of the power relationship. One of the most potent forms of power in any organization is the leader's access to accurate, relevant, and timely information. Information shared with key staff members and rapidly passed down the chain of command to the action level is a key ingredient to unit effectiveness. An ongoing Army research program into this phase of leadership (involving 41 battalions) has concluded that the effective and efficient passing of information is *the* overwhelming factor in comparing "very successful" to "less successful" units. However, despite this positive evidence of the importance of passing on information as a facet of the passing down of power, we are still plagued by empire builders who consolidate power and information and hold onto both for dear life.

Charting the future. There is a great difference between charting the future and planning. The latter is essential for any unit, but it often devolves into a mechanistic, format-bound drill that unnecessarily reduces unit flexibility (If it isn't in the plan—it can't be done.)

When a leader charts the future of his unit, he becomes a point man, one who scans the total environment, discovers new possibilities of action, and considers all the alternatives. He leaves himself room to move and does not become chained to a plan. His early decisions, based on the above actions, will induce a high degree of clarity within his unit, will avoid much confusion, and will not create unnecessary and wasted work and effort for his troops.

Because scanning involves thinking, the leader who indulges in scanning is often accused of loafing. However, it is imperative that leaders set aside some time for thinking, because a great deal of considered thinking is required before any intention can be efficiently transformed into actuality.

Under this heading also comes *imagineering* . . . the thinking of how it should be. It is essential that leaders from time to time focus their inner vision on the far horizons and imagine how it could be.

Shaping values. Field manual 100-1, *The Army*, lists the following institutional values that form the bedrock of our profession.

- Loyalty to the Nation and its heritage.
- Loyalty to the institution.
- Loyalty to the unit.
- Personal responsibility.
- Selfless service.

These values comprise the Army ethic and serve to place the Army in the proper context within our society. This pro-

fessional ethic translates our Nation's heritage into a set of ideal end-states that all individuals and units in the Army should strive to attain.

Every individual brings with him into the Army his own unique personal value system. Therefore, it is crucial that leaders identify the common, overlapping, individual values which support those values that comprise the Army ethic and to inculcate (in those who do not already possess them) the Army values and to maintain, by example, those values. The strong acceptance of common values will result in improved unit performance and make the unit stronger against disrupting external influences. Strongly held unit operating values such as "do it right the first time" and "never walk away from a deficiency," will serve to markedly improve unit performance and instill a self-reinforcing unit pride.

Accomplishing these value-shaping functions is essential for our leaders and depends upon several vital actions. First, is the welcoming of newcomers. Every new soldier, NCO, and officer needs to personally hear his leader's statement of the unit's values and how they relate to and support the Army ethic. Second, the modeling of these values on and off duty is an absolute prerequisite for effective leadership. This function is a particularly important one for officers and NCOs since they are at all times the most highly visible examples to the younger soldier. Third, is the integration of unit values into all aspects of unit life—training, maintaining, and inspecting. Finally, there must be some significant unifying experience. Lacking battle experience, the most unifying of all unit activities, this experience must come from the training, inspection, deploying or use of the unit in any way that involves a high degree of difficulty, risk, or danger. Such experiences can come from ARTEPs, unit deployment to an overseas exercise, or the semi-annual tank gunnery qualification. The latter can become a particularly unifying unit experience for tank gunnery is of vital importance to combat readiness and can have a profound impact on a battalion's values and unified existence.

The behavioral imperatives for leaders include: empowering subordinate leaders, charting the future, and shaping unit values. There is nothing simplistic about any of these, but they are all achievable and will result in the tremendous satisfaction that all soldiers derive from belonging to an outstanding unit.

MICHAEL D. SHALER
Lieutenant Colonel, Armor
TRADOC

Recognition Quiz Answers

1. **M3 Bradley (US).** The M3 CVF mounts a 25-mm automatic cannon, TOW missile launcher, and a 7.62-mm coaxial machinegun. It carries a crew of 5 at speeds up to 66 km/hr on land and 7.2 km/hr on water. It has a combat weight of 21,923 kg, a cruising range of 483 km and a power-to-weight ratio of 20.69 hp/ton.

2. **YPR-765 (Netherlands).** This American-made armored personnel carrier is also known as an armored infantry fighting vehicle (AIFV). It mounts a 25-mm cannon with a coaxially mounted 7.62-mm machinegun. It carries a crew of 3, plus 7 infantrymen. It weighs 12,426 kg, has a maximum road range of 490 km and a maximum speed of 61 km/hr.

3. **VCTP (Argentina).** This IFV was designed in West Germany. It has a two-man turret mounting a 20-mm cannon and a 7.62-mm machinegun. It can carry 12 men, including the crew, at a maximum road speed of 72 km/hr. It weighs 27,000 kg, combat loaded, and has a maximum road range of 870 km with additional fuel drums.

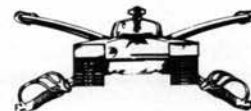
4. **FV107 Scimitar (UK).** The Scimitar reconnaissance vehicle mounts a 30-mm Rarden cannon with a 7.62-mm coaxially

mounted machinegun. It has a combat weight of 7,756 kg, a power-to-weight ratio of 24.89 bhp/ton, and a maximum road range of 644 km. It has a crew of 3 and a maximum speed of 80.5 km/hr.

5. **AMX-10P (France).** This ICV mounts a 20-mm cannon (.50 caliber machinegun shown) and a 7.62-mm coaxial machinegun. Its combat weight is 14,700 kg, power-to-weight ratio is 19.71 hp/ton, and it has a maximum road speed of 65 km/hr. It carries 3 crew and 8 passengers and has a maximum road range of 600 km.

6. **BMP M1981 (USSR).** Recently paraded in Moscow (Nov. 1982), this variant of the BMP IFV mounts a 30-mm automatic cannon and appears to mount a canistered ATGM similar in appearance to either the AT-4 or AT-5. Employment of a small caliber automatic cannon on the BMP allows for a substantial increase in the available volume of fire and would be highly effective against lightly armored vehicles. A similar, or possibly the same, variant was photographed in Afghanistan in 1981.

(Prepared by SSG David L. Merryman, Intelligence NCO, Threat Branch, DCD, USAARMC, Ft. Knox, Ky.)



Commanders Update

The annual list of armored unit commanders that appears in *ARMOR* Magazine is compiled from MILPERCEN data and changes will appear as received by the magazine.

COL Harvey, Thomas H. Jr. 9th Cav Bde Fort Lewis	LTC Bouault, Louis L. 2-68th Avn Bn (AH) Fort Lewis
COL Harding, James R. 2d Bde, 101st Abn (AAst) Fort Campbell	

Officers For Flight Training

MILPERCEN is looking for qualified commissioned officers to enter the Army's flight training program. Approximately 80 openings will be available during the next fiscal year for officers currently on active duty. Standards are high: Officers on active duty who have less than 48 months of active duty are eligible; they must pass a Class 1A flight physical and score a minimum of 90 on the Flight Aptitude Selection Test (FAST). Applications must be made to the Aviation Flight Training Selection Board which will be held on 1 April, 1 July and 1 November in 1983. Applications should be submitted through command channels to:

Commander
US Army Military Personnel Center
ATTN: DAPC-OPE-V (For SC 15 — Aviation)
 —or—
DAPC-OPG-T (For SC 71 — Aviation)
200 Stovall Street
Alexandria, Virginia 22332

EMF Information Accuracy Stressed

The MILPERCEN assignment process is changing from Centralized Assignment Procedures III (CAP III) to Personnel Deployment and Distribution Management System (PERDDIMS) and it is vitally important that the information listed on your Enlisted Master File (EMF) be accurate and reflect the total skills in your PMOS, SMOS, and AMOS. The 9-digit MOS will reflect your skills by special qualification identifier, additional skill identifier (ASI) and language identification code.

In order to better assist PERDDIMS in nominating soldiers with special skills to man the new equipment being fielded, it is imperative that MILPERCEN be able to identify those skills and assign the soldier to where the requirement exists. CMF 19 ASIs follow:

ASI	MOS	Title	Training Location
A8	19D/K/Z	M1 Master Gunner	Ft. Knox
B8	19E	M60A3 Crewman	Ft. Knox/OJT
C2	19D	Dragon Gunner	Ft. Benning/OJT
C5	19D/E/Z	M48A5/M60A1 Master Gunner	Ft. Knox
D3	19D	M3 CFV Crewman	Ft. Knox/OJT
D8	19D/E/Z	M60A3 Master Gunner	Ft. Knox
Q8	19D/E/K/Z	Tac Air Opn Sgt	Hurlburt Fld
R8	19D/E	M551 Crewman	Ft. Bragg/OJT
Z1	19D	Aerial Scout Observer	Worldwide/OJT

Armor soldiers who have received special training and qualify for an ASI, should request the ASI through personnel

channels. Some ASIs are DA-controlled (A8,C5,D8,Q8). It must be emphasized that accurate, up-to-date information be included in your EMF as this will assist MILPERCEN in getting you to the right command at the right time with the right grade and skill—and with minimum inconvenience to you.

Army Linguists Needed

The Army needs linguists in Career Management Field 19, in all MOS's and grades from E5 and above. The need is expected to grow.

The Language and Civilian Education Branch of MILPERCEN's Enlisted Personnel Management Directorate has been created to better manage enlisted linguists and is responsible for their overall management, projecting future requirements for training linguists and for distributing linguists according to the Army's priorities.

If interested in linguistic training, check your local Test Standardization Office where you will be administered the Defense Language Proficiency Test on which you must score 89 or higher. Upon achieving this score, submit a DA Form 4187 through your Personnel Administration Center to request language training.

Drill Sergeant Program Revised

The procedures for assigning and training soldiers selected for Drill Sergeant duty are being changed. Currently, soldiers selected for Drill Sergeant duty are reassigned to an Army Training Center (ATC) and scheduled for attendance at the Drill Sergeant School (DSS). The new procedure will require CONUS-based soldiers to attend DSS on a TDY basis. Upon completion of training, they will return to their parent unit for reassignment to an ATC. Soldiers returning to CONUS will move on a normal PCS to an ATC and be attached to the DSS for training.

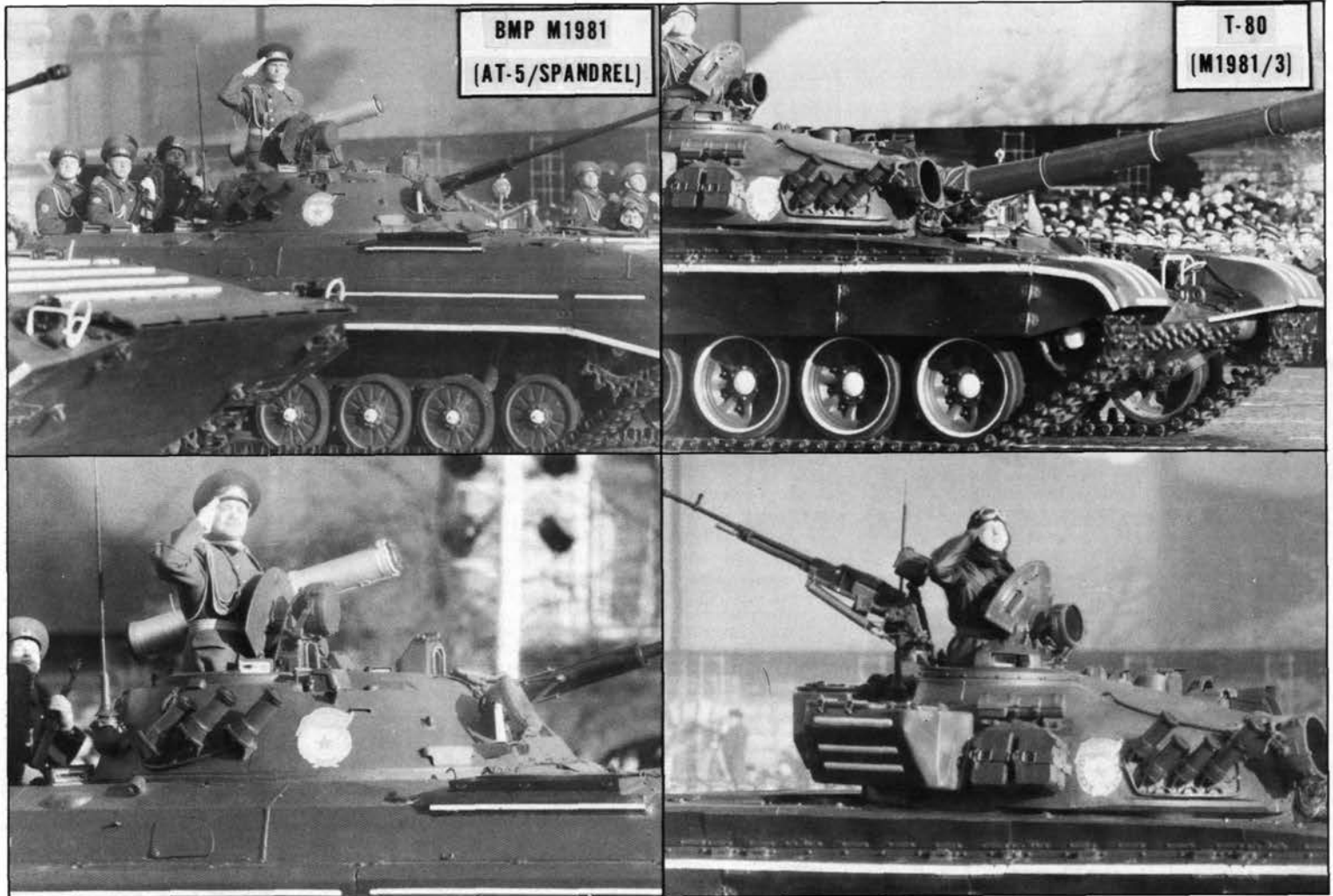
M1 Tank Crewman (MOS 19K) Assignments

Great emphasis is placed on M1 tank crewman (MOS 19K) being assigned only to installations that have the M1 tank.

There are soldiers who perceive these assignment limitations as undesirable. However, these limitations will decrease in the near future as deployment of the equipment increases. It would be wise for the soldier to view the M1 program with an eye toward what the future holds. The M1 is a major weapons system and is in the early stages of deployment. Career oriented soldiers should be aware that by the first quarter of fiscal year 1985, there will not be any M60A1 battalions remaining in the active force, and by 1988 the majority of the active army units will have the M1.

On recent DA-level promotion boards, soldiers in MOS 19K have had a higher selection rate than their 19E contemporaries and this trend is expected to continue into the future.

NEWS NOTES



Two New Systems Paraded in Moscow

The November 1982 Moscow Parade revealed two new combat vehicle systems, a tank called the T-80 and a BMP variant called the BMP M1981.

The major characteristics of the BMP M1981 are a 30-mm main gun and the employment of the AT-5 ATGM. The AT-5 ATGM gives the BMP-M1981 antitank capability to 4,000 meters in about 20 seconds.

T-80 has been confirmed as the Soviet designation of the T-72 variant formerly called M1981/3. Features include grenade launchers and the presence of a single enlarged gunner's optic indicating a laser rangefinder.

Armor Association Honor Roll

The following individuals have been members of the US Armor Association for 50 years or more.

BG W.S. Bailey	MG R.W. Grow	GEN H.H. Howze	COL C.G. Mechan	GEN R.W. Porter, Jr.	COL J.H. Stodter
COL A. Barr	MG P.C. Haines, III	MG R.L. Howze	COL A.M. Miller, III	COL C.H. Reed	COL G.J. Tinkham
COL C.O. Burch	LTC A.J. Hanna	COL L.K. Kurland	LTG S.L. Myers	BG G.A. Rehm	COL J.W. Viner
LTC H.H. Burgess	COL H.H.D. Heilberg	MG H.C. Lodge	MG W.H. Nutter	Mr. J.E. Shaw	GEN I.D. White
COL L.B. Conner	BG S.R. Hinds	GEN G.R. Mather	BG H.C. Patteson	LTC J.W. Sheffield	LTG W.H. Wright
COL S.V. Constant	BG W.A. Holbrook, Jr.	COL D.M. McMains	MG J.H. Phillips	COL S.D. Slaughter, Jr.	LTC W.W. Yale
LTG C.C. Dodge					Mr. C.D. Young

The names of the 50-year members are engraved on a plaque in commemoration of their years of membership. The plaque can accommodate 120 names and will be displayed

each year at the Annual Armor Conference and Armor Association meeting at Fort Knox.

THE BROTHERHOOD OF WAR:

Volume I, "The Lieutenants"; Volume II "The Captains," by W.E.B. Griffin. Jove Publications, Inc., New York, NY, 1982. 416 pages. \$3.95 (paperback).

I write this review with very mixed feelings. On the one hand, I have to give the author full credit for a rousing tale of derring-do and devotion to duty. His principal characters: Bellman, MacMillan, Hanrahan, Felter, Lowell, and both Parkers, remind the reviewer of people he's known and served with—people who are the soul of the Army. His descriptions of places like Korea, North Africa, and Greece ring true. The attitudes and habits of all the characters show them to be real people, not cardboard caricatures. As stories, I found that, once I had begun to read them, I couldn't stop without completing them.

On the other hand, I also couldn't read them without constantly spotting niggling technical errors that tended to detract from the story. I believe that these details will aggravate anyone who ever set foot in the turret of a tank, and probably anybody who ever wore the Army uniform. Some perfectly horrible examples:

Characters wearing various insignia, awards, and decorations never mentioned in AR 600-200.

Characters performing parts of the manual of arms in contravention of FM 22-5.

Incorrect unit designations; e.g., 1st Armored Division, rather than 4th Armored Division, linking up with Bastogne to relieve 101st Airborne Division.

In conclusion, I recommend that ARMOR readers read both volumes twice; once to enjoy the stories, and once to see how many mistakes they can find. Not since the sun set in the East over Da Nang in *The Green Berets*, has there been such a fruitful field for frustrated, would-be Inspectors General.

PETER M. LLOYD
Major, Armor
USARPAC

AUSTRALIA AT WAR, by John Robertson. William Heinemann, Australia. 1982. 269 p. \$31.50

From the Boer War to Vietnam, the Australian armed forces have maintained a high tradition of combat valor and military proficiency. Australia faced its sternest test as a nation during WW II and its vital role in the war against Japan is often overlooked in comparison with the much larger US Pacific operations, as well as its own battlefield exploits in North Africa.

This work is basically a broad politico-military overview of Australia's role in the Allied war effort and provides excellent coverage of major trends and events with a solid collection of source materials.

Early chapters explore Australia's fight against the Axis in North Africa from 1940 to 1942. Readers will recall the Anglo-Australian defense of Tobruk against Rommel's *panzer* forces that earned them the title, "Desert Rats." Robertson also recounts the valiant efforts by Australian naval forces in the victory at Cape Matapan and by their airmen with the RAF over Nazi-occupied Europe.

The other side of the story, the political bickerings, are well recounted. The issue of where to place Australian forces, at home or abroad, became acute after the Japanese entered the war. Australia was not prepared to face an invasion as its best forces were overseas, and the Japanese conquests of Malaya and the Dutch East Indies in early 1942 posed real problems for the Australians.

Even worse, Robertson notes that nearly 14,000 of 21,400 Australian POWs would die in Japanese prison camps.

The arrival of U.S. forces in Australia and the South Pacific resolved the invasion threat and Australian air, sea and land forces played a vital role in containing large pockets of Japanese in the New Guinea and Solomons areas. Later, Australian forces went on the offensive with numerous amphibious assaults in the Dutch East Indies.

Thoroughly researched and well-written, this book affords interesting reading on a lesser-known historical topic.

DR. JOSEPH E. THACH, JR.,
Lieutenant Colonel, MI, USAR
Washington, D.C.

THE QUEST FOR VICTORY, by John I. Alger. Greenwood Press, Westport, CN. 1982. 318 pages. \$29.95.

John Alger's thorough analysis of the historical background of both the derivation and application of the principles of war is a major step toward understanding the application of those principles.

After a brief look at pre-19th century martial principles, Alger begins a more detailed examination of the birth of modern military thought during the Napoleonic era.

Looking at English, French, German, and Russian, as well as American military doctrine, Alger traces the influence of the principles of war through the 19th and 20th centuries and concludes with a look at our 1978 version. This is an unfortunate stopping place, for at about the time Alger finished his manuscript, work was underway at the Army War College to rewrite and redefine the classic principles of war to include not only their tactical dimension but also their strategic dimension.

The swing in defining the principles of war has gone from the Vietnam era of the use of quantified data and computer models to overawe, and eventually dominate, military decision making to the more philosophical theories derived from Carl von Clausewitz's seminal work, *On War*. Clausewitzian theory

recognized the unique character of every battlefield situation and the criticality of intangible moral factors which can neither be quantified nor computed. Current theory and doctrine, therefore, are designed not so much to provide mathematical formulas and rules but to provide "a thinking man with a frame of reference."

All of us who consider ourselves professional soldiers are, or must become, "military students" if we are to recapture the battlefield excellence that was once, and must become again, the hallmark of the US Army. *The Quest For Victory* is a particularly useful reference work in this behalf.

HARRY G. SUMMERS, JR.
Colonel, USA
Army War College

MILITARY VEHICLES OF WORLD WAR II, by John Church. Sterling Publications, New York, NY, 1982. 160 pages. \$19.95.

The dust cover illustration and the broad-sounding title belie the restrictive nature of this book. Instead of a general overview of WW II military vehicles, it is a rather narrow review of primarily British and US vehicles, with the bulk of the material on British vehicles. Numerous fascinating vehicles are described, but not pictured.

Other books are available at less expense with more material and photographs available for the serious reviewer of WW II military vehicles.

F.W. CRIMSON
Major, Ordnance
Fort Knox, KY

STRATEGIC WEAPONS: AN INTRODUCTION, by Normal Polmar. Crane, Russak & Co., Inc., New York. 1982. 126 pages. \$16.50 (\$8.95 paperback).

This is a revised and updated edition of the book published in 1972. It provides the general reader a non-technical outline of the history of strategic weapons development since 1945 and a very succinct discussion of current US-Soviet strategic weapons and possible future trends.

The primary focus is on US-Soviet strategic weapons, but one chapter is devoted to nuclear weapons development of the other nuclear powers—Great Britain, France, and China.

A number of excellent photographs and charts are included. Appendices provide very descriptive 1982 US-Soviet comparative data on aircraft, missiles and submarines.

Strategic Weapons is both informative and timely.

JAMES B. MOTLEY
Colonel, USA
Atlantic Council of the US

STEEL ON TARGET

It was obvious that they were ordinary people. The tall bony man in the red hunting cap wore working clothes. The short woman in a cloth coat wore a scarf on her head. They stood before the dark marble wall exchanging quiet words. Mostly, though, they said nothing, and only the man's comforting arm on his wife's shoulder revealed the profound measure of devotion to the memory of a loved one. It was a private moment upon which no one dared to intrude, to ask if the name on which they gazed was that of a son, a relative, or a friend. In a while they quietly walked to their car and disappeared into the commuter traffic on Constitution Avenue.

We who lead soldiers into battle must always keep in mind the special trust and confidence placed in us by the ordinary people of our country. It is their sons, relatives, and friends who man our fighting vehicles and make our armored force a viable deterrent to aggression. These ordinary, hard-working and reverent people are not strangers to adversity. Many have had first-hand experience with tyranny and immigrated to America to escape it. Others were born here and have known not the sting of the tyrant's hand. Both however, have known the sacrifice necessary to provide their families the best of which they were capable. Whether native-born or naturalized, these ordinary people hold in common an undying love of their country, an unshakable belief in its destiny, and an unwavering conviction that its armed forces serve a worthy cause, and that service in their uniforms is an honorable undertaking.

These ordinary people demand of us an extraordinary price to pay for the privilege of leading their sons, relatives, and friends into battle. The price for their trust and confidence is high and payments come due daily. Failure to pay risks disdain in peacetime and defeat in wartime.

The currency with which we leaders pay is called self-sacrifice. In peacetime, it calls for devotion to duty, self-discipline, renunciation of comfort, perfection of our tactical skills and technical proficiency, and the subordination of our own welfare to that of our soldiers'. In wartime it means leading from the front, enduring the same hardships and dangers demanded of our soldiers and, if the situation requires, paying the price of leadership with our lives.

When the conflict ends and the books are balanced, the ordinary people of the country will look upon the ledgers and judge the cost in personal terms. At that moment, when a working man and his wife gaze upon the slate and reflect upon a memory, the question will be, "Did the leaders sacrifice what was necessary to provide their soldiers the best of which they were capable"? Let it never be said that the leaders paid a lower price for victory than those they led.

Good Shooting!





Symbolism

The blue and gold of the shield were the unofficial colors of the regiment for about 10 years before the approval of this coat of arms. The eight mullets (stars) show the regimental number and cavalry tradition ascribing the origin of the pierced mullet to the rowel of a spur. This is further indicated by the horse. The bear is the emblem of California, where the regiment was organized in 1866.

Distinctive Insignia

The distinctive insignia consists of the principal charges and motto of the coat of arms. It is a demihorse issuant rampant argent from a band fessways or charged with eight mullets azure pierced of the second, surmounting a ribbon scroll sable with the regimental motto—*Honor and Courage*—of the second.

8th Cavalry (Honor and Courage)

Lineage and Honors

Constituted 28 July 1866 in the Regular Army as 8th Cavalry. Organized 21 September 1866 at Angel Island, California. Assigned to 15th Cavalry Division December 1917-May 1918. Assigned 13 September 1921 to 1st Cavalry Division.

Dismounted 28 February 1943 and reorganized 4 December 1943 partly under cavalry and partly under infantry tables of organization and equipment. Reorganized wholly as infantry 20 July 1945 but retained cavalry designations. Reorganized 25 March 1949 with troops redesignated as companies.

Reorganized 15 October 1957 as a parent regiment under the Combat Arms Regimental System; concurrently, relieved from assignment to the 1st Cavalry Division.

Campaign Participation Credit

Indian Wars

Comanches
Apaches
Pine Ridge
Arizona 1867
Arizona 1868
Arizona 1869
Oregon 1868
Mexico 1877

Korean War

UN defensive
UN offensive
CCF intervention
First UN counteroffensive
CCF spring offensive
UN summer-fall offensive
Second Korean winter
Korea, summer-fall 1952
Third Korean winter

World War II

New Guinea
Bismarck Archipelago
(with arrowhead)
Leyte
Luzon

Vietnam

Defense
Counteroffensive
Counteroffensive, Phase II
Counteroffensive, Phase III
Tet Counteroffensive

Decorations

Presidential Unit Citation (Army), Streamer embroidered *LUZON* (2d Squadron, reinforced, cited; WD GO 38, 1946)

Presidential Unit Citation (Army), Streamer embroidered *TAEGU* (2d Battalion, reinforced, cited; DA GO 38, 1952)

Presidential Unit Citation (Army), Streamer embroidered *PLEIKU PROVINCE* (1st and 2d Battalions cited; DA GO 40, 1967)

Philippine Presidential Unit Citation, Streamer embroidered *17 OCTOBER 1944 TO 4 JULY 1945* (8th Cavalry cited; DA GO 47, 1950)

Republic of Korea Presidential Unit Citation, Streamer embroidered *WAEGWAN-TAEGU* (8th Cavalry cited; DA GO 35, 1951)

Republic of Korea Presidential Unit Citation, Streamer embroidered *KOREA* (8th Cavalry cited; DA GO 24, 1954)

Chryssoun Aristion Andrias (Bravery Gold Medal of Greece), Streamer embroidered *KOREA* (8th Cavalry cited; DA GO 2, 1956)

Presidential Unit Citation (Army), Streamer embroidered *TRUNG LUONG PROVINCE*. WD GO73, 1968.