ARMOR
January-February 1973

LASER TANK FIRE CONTROL SYSTEM

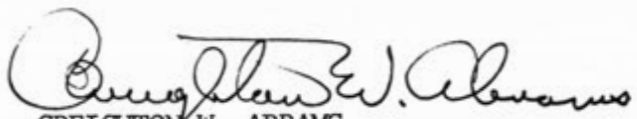
UNITED STATES ARMY
THE CHIEF OF STAFF

TO THE OFFICERS AND MEN OF ARMOR

It is with pleasure that I extend the hearty congratulations of the United States Army on the occasion of the 196th anniversary of Armor.

Together with its predecessors -- the Cavalry, the Tank Force, and the Armored Force -- Armor has a history replete with battlefield successes and an enviable record of meeting every challenge successfully. The dedication, drive, and courage of the Armor soldier who made that history is exemplified by his modern counterpart. Today, as the Army decreases in numbers, it must develop further its ability to concentrate preponderant fighting power rapidly at the decisive time and place -- an aspect inherent to Armor as a result of its reconnaissance capability and striking power. I know you will lead the way in this effort.

The men and women of the Army join me in saluting your past performance and wishing you continued success in meeting future challenges to our national security.



CREIGHTON W. ABRAMS
General, United States Army
Chief of Staff

ARMOR

the Magazine of Mobile Warfare

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ARTICLES

FEATURES

DEPARTMENTS

ON THE COVER . . .

Over the years, tank fire control systems have evolved into reliable, precise instruments. The latest development, the tank laser rangefinder, will improve chances of a first round hit significantly.

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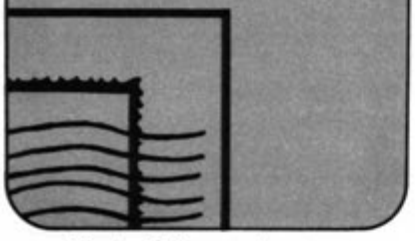
letters to the editor



Master's Degree Program For Army Officers

Dear Sir:

General Bruce Clarke's letter in the September-October issue of *ARMOR* concerning "Master's Degree Program in Military Art and Science" is certainly worthy of consideration by the highest levels in both the military and academic communities.

The military officer who has graduated from a Command and Staff College level course has had more experience and formal education in his discipline—Military, Naval or Air Science—than his civilian counterpart with a master's degree in one of the accepted disciplines. Further, in our military educational system there exists a prerequisite for practical experience between each level of schooling. This is not true in the academic community. Many bright young college graduates go straight through to a Ph.D.

Although an advanced degree in Military Science may not be initially acceptable in the academic community, usage and realization of the time and effort required to reach this level will go a long way to insure its acceptance.

WILLIAM L. BOYLSTON
Colonel, Armor
Professor of Military Science
North Carolina State University

The Pod Concept

Dear Sir:

"Let's Pod the Tank," which appeared in the November-December issue of *ARMOR*, deserves the serious attention of tankers and armored cavalrymen alike. In his article, Mr. Richard D. Engler has advocated that Armor practice what it preaches; namely flexibility.

A main gun, coaxial machine gun and heavy machine gun or automatic cannon represent a fine, proven armament combination for tanks, yet there are environments best entered with different armament configurations. A wide variety of armament options have been developed and await the initiative of imaginative Armor leaders. Such initiative is of great importance to Armor, as the full potential of pod mounted weapons is even greater than Mr. Engler suggests in his article.

In addition to the lighter weapons, recoilless rifles and antitank rocket systems can be mounted in pods loaded and serviced from within an armored vehicle. Loading doors, when opened, would swing a large tube such as the one used on the *TOW* system out of battery to facilitate loading from within the turret.

Light armored vehicles and defensive weapons systems would benefit greatly from the adoption of pod mounted weapons systems. In fact, antitank rockets and recoilless rifles may find pod mounting the key to their survival on the modern battlefield.

Are quarter-ton vehicles really an intelligent means to introduce a costly missile system onto the most lethal battlefields in the history of warfare? Quarter-ton vehicles are almost as foolish as the gunshields on Soviet antitank guns were effective against the ordnance of World War II, but are of questionable value against airbursting bomblet-type munitions. Pods lend themselves to defensive weapons since the back of a pod can be left open to allow exhaust gases from the ordnance to escape. Yet, despite the apparent advantages of pod mounted weapons, there remains an important argument against them which must be addressed.

Mr. Engler points the reader to the fact that "combat aviation has long known and enjoyed the advantages of the weapons pod concept" and, some critics may assert, this is exactly where the pod belongs. Why duplicate weapons systems on the ground that can be introduced onto the battlefield at over 200 miles per hour in the air? Are not ground-mounted pods really a less flexible duplication of an existing air capability?

These questions and criticisms overlook a paramount advantage of ground-mounted weapons systems—ground weapons are there when the commander needs them the most: during the first 30 seconds of a meeting engagement; when the enemy dominates the air; when the hostile air defense severely restricts friendly air; for the immediate counter-attack; when the enemy attacks in a driving rainstorm. Moreover, the weapons pods mounted on the ground are likely to have a higher theater availability than the more complex aerial weapons platform with the greater maintenance problems inherent in aircraft.

Maintainability of the pods is an especially strong plus factor favoring the adoption of the system. Many Armor commanders have justifiable second thoughts on the average crewman's ability to eliminate malfunctions in an electrically controlled minigun. However, multiple hydraulically directed *M60* machine guns can provide increased firepower yet remain well within the technical competence levels attainable by the average soldier. Simple, inexpensive fire control systems for pod mounted weapons would insure that our bounds of technical expertise were not exceeded and the weapons system was inexpensive enough to manufacture in quantity. There is every reason to expect pods to have outstanding accessibility for repair and adjustment. Armed forces of developing nations should be able to cope with the operational and maintenance requirements of pod mounted armament, thus simplifying training problems and encouraging foreign sales.

Whether an armament pod be an auxiliary weapons system on a main battle tank or a primary armament system on a light armored vehicle, the pod presents Armor leaders with a wide range of armament options—options which can only enhance Armor's claim of being The Combat Arm of Decision.

JOHN C. SPEEDY III
Captain, Armor
Durham, North Carolina 27704

Combined Arms Operations

Dear Sir:

How many times have we heard about combined arms operations? How many times have we seen them in use? We know they are successful, and we know armored cavalry was organized to exploit this success. But why only armored cavalry? They aren't the ones to become heavily engaged in combat—tank and Infantry units are. Yet, why are these companies made into combined arms teams only during field operations? If the idea is so good, why aren't more units so organized?

Therefore, I would propose two changes in the TOE:

- The 106mm recoilless rifles should be replaced by a platoon of tanks in the Infantry company TOE. I have heard many Infantry officers complain about the 106. But we in Armor have the answer; the best weapon against a tank is another tank. The platoon of tanks in an Infantry company would offer much more flexibility, firepower and armor protection than the 106. I further recommend the addition of one turret mechanic to the company's

maintenance section. If this is not feasible, then at least one turret mechanic should be added to the HHC maintenance platoon.

- A platoon of mechanized Infantry should be added to the tank company TOE. I recommend that this Infantry platoon consist of four rifle squads. This would greatly increase the ground-holding capability of tank companies, and the weapons squad would not be needed.

If my proposals would make these companies too large, I offer an additional suggestion: drop one platoon of tanks and one platoon of Infantry from each tank and Infantry company's TOE.

The new combined arms unit would eliminate the misuse, abuse, time consumption and confusion often associated with cross-attaching units. Tankers and infantrymen would eat, sleep and pull duty together. They would know each other's strengths and weaknesses long before moving into the field. The Infantry company commander would know what to expect from his tank platoon leader. He would become familiar with the capabilities and limitations of Armor, and thus could deploy his tanks more effectively. The same would hold true for the tank company commander and his Infantry platoon leaders. Obviously, it would be easier for units to work together well in the field if they work together in garrison.

I foresee no training problems. Since mechanized Infantry platoons would be bringing with them weapons already found in a tank battalion, weapons qualification would not be a problem. Tank platoons in an Infantry battalion could easily run through tank gunnery on their own or with a tank battalion. Outside of weaponry, all other training is the same.

These proposals would work under any series TOE, using either the *M60A1* or *M60A2*. The company organization could easily be modified to fit any future change in the number of tanks in a tank platoon.

If the principles of combined arms operations, mutual support, and the tank-Infantry company team are really that important and that successful, then our small-unit organization should be based on them.

WILLIAM J. VANDEN BROOK
Captain, Armor
Fort Hood, Texas 76546

A Different View Of Exercise GALLANT HAND

Dear Sir:

The following comments are made in partial answer to the article entitled "Hell On Wheels Defeats the Heliborne Threat," by Lieutenant Colonel J. Hollis McCrea Jr., in the September-October issue of *ARMOR*.

We are all familiar with the old story about the blind men and the elephant: each of the blind men touched a different part of the animal and assumed that what he had felt was representative of the whole.

In analogous fashion, Exercise GALLANT HAND is the elephant, and we have one man's report. To learn what the beast really looked like, we need to hear from several others who felt different parts. As the commander of the 1st Cavalry Division units and others who made up the Army element of the aggressor force in the exercise, I feel that I am somewhat qualified (as another blind man) to voice an opinion.

First, a little background. I participated in the early planning stages of the scenario, and can assure Colonel McCrea that the goal of the exercise, and of the aggressor force, had nothing to do with proving or testing the TRICAP concept. Rather, at least from the ground aggressor point of view, our objective was to field a tactical force which would fully exercise the "battle-proven tactics" of the 2d Armored Division. It was designed to force, by by means of a deep penetration on D-day, a significant counterattack reaction over respectable distances by the total 2d Armored Division forces involved; to then attack on D+1 on a broad front in order to give as many Hell On Wheels troopers as possible the feel of fighting a live enemy; and, finally, after an indecisive period on D+2, to delay back to Lobo during the remainder of the exercise, again countering the US Forces, as nearly as possible, across the entire front. There was never any doubt concerning the fact that we, the aggressors, were a controlled element in the exercise, although we were given a good deal of latitude in our tactics.

Now, let's look briefly at what actually happened, as viewed from the aggressor side. First, by H+1 on D-day, using the "battle-proven tactics" referred to by Colonel McCrea, aggressor had made two significant penetrations of the US defensive positions with armored forces in battalion strength. These penetrations had been achieved by exploiting the results of multiple attacks across the entire front to detect weak points and gaps. We were able to combine the penetrations with a battalion airmobile assault to seize critical terrain behind the defending 2d Armored Division battalion reserves.

If this airmoble assault was detected (the "D" in DARE), we were certainly never made aware of that fact, because the "ARE" did not follow. In fact, by H+3, we had successfully linked up with the airmobile forces and passed beyond them according to our attack plan. I should add parenthetically here that this airmobile assault was scheduled unrealistically late in the scenario in order to insure detection and give the defenders an opportunity to react with tactical forces.

A second significant point: the Lobo aggressors planned and launched only two major airmobile assaults in the entire exercise. The first was mentioned above, and the second was a deep assault across the Cowhouse Creek on D+1. The latter was detected, as nearly as I have been able to determine, not by the well-thought-out DARE plan, but rather, by intercepting radio traffic D-day night between the Special Forces elements serving as pathfinders and my aggressor headquarters. There may have been, as Colonel McCrea states, a "great number of spottings," but significantly, there were no other aggressor airmobile insertion attempts. It would be interesting to determine the number and evaluate the cost in lost sleep and frustration caused by reactions to false alarms and our feints. Only Hell On Wheels can supply the necessary data.

I think it important that we not let the loaded phrases in Colonel McCrea's otherwise informative article obscure one lesson which should be clear to all. A multiple attack, using a wide variety of capabilities, especially if those capabilities include air cavalry elements using the *TOW* helicopter and more conventional scout and gunship teams (none of which were mentioned in the article), will inevitably stretch the resources of the defender, perhaps to the breaking point. There are also some other lessons to be learned in the areas brought up by the author. Certainly, his point is well made and bears repeating that an adequate defense against enemy use of air involves "the eyes and ears of every soldier in the division."

I personally do not agree with his statement that "if at all possible (the reaction force countering an airmobile insertion) should be airmobile itself." He, in fact, pinpoints the advantage of armor in the reaction role later in the article when he states that, once on the ground, airmobile forces are "at a great disadvantage against armored or mechanized elements."

Certainly, nothing that happened on Exercise GALLANT HAND supports the idea of an airmobile reaction force. If, however, by airmobile he means air cavalry elements, then I would agree that they are useful.

The real lessons of the exercise have nothing to do with TRICAP or airmobile/air cavalry versus armor, since the aggressor units were training aids bound by the non-TRICAP scenario. From our viewpoint, several valuable lessons were learned or relearned. A few of these I have mentioned above. A number require fre-

quent repetition such as the necessity for extraordinary coordination and security measures on flanks and boundaries.

There are two additional points I offer for consideration. First, as we do get into exercising, testing and training with air-mobile/air cavalry/armor forces opposing each other, we need far better, more responsive control and hit-kill indicators than we have had in the past. The situation develops much too rapidly for the old systems to handle, and a bunch of disgruntled troops shouting "I got you first" does little to enhance training.

Second—and I say this recognizing that each of us is convinced that he has the most effective unit in the United States Army—jingoism and unit flag waving are fine in their place, but I question whether that place is a professional journal. Colonel McCrea had some good points to make. A greater level of objectivity would probably have enabled him to make his points more effectively—at least to one group of 1st Cavalry troopers who are convinced to this day that, had it not been for the scenario, Hell On Wheels would have had to be brought back to the Fort Hood reservation on lowboys from Austin at the conclusion of the exercise.

JOHN C. FAITH
Colonel, Armor
Assistant Chief of Staff (G3/DPT)
III Corps and Fort Hood

Replies To G Series TOE

Dear Sir:

Major Richard H. Merritt's letter in the September-October issue of *ARMOR* concerning the "G Series TOE," asserts several points which I cannot accept, aside from the fact that the new TOE is actually the H series.

His first statement is that the *M548* 6-ton cargo carrier is a better vehicle for the tank battalion than the *M54* 5-ton truck. Based on my experience as a commander of Armor and mechanized Infantry units in CONUS and RVN, and during multi-division exercise in USAREUR, I have found the 5-ton truck to have a considerable advantage in maintenance required, versatility, ruggedness, and the ability to rapidly resupply units.

The *M548* was far from being a salvation; rather, it was a costly maintenance burden. The 5-ton required much less maintenance and fuel, and served superbly as a personnel, fuel and cargo carrier. Granted, a full-tracked vehicle possesses greater cross-country mobility then wheeled vehicles. However, I never encountered a situation where company or battalion sized Armor units could not be resupplied by the 5-ton. In addition, its ability to move items from rear areas at a high rate of speed over unimproved roads and trails was another plus.

Also, I take issue with Major Merritt's appraisal of the need for a combat support company. His hypothesis that it grew out of the Vietnam conflict where inexperienced company commanders and operations officers could not cope with the span of control, is not entirely correct. After commanding a headquarters company for over a year (following the command of a tank company), I feel it highly desirable to eliminate a situation where a single company commander supervises 12 diverse sections totaling over 300 men.

With regard to the control of the platoons of the combat support company, the concept of tactical employment remains the same: under battalion control. The additional radio net handles administrative traffic formerly directed to the headquarters commandant over the battalion admin/log net.

Given a tank battalion with eight or ten *M548* cargo carriers, and without a combat support company, I would show you one with an increased maintenance burden and decreased combat capabilities.

LARRY R. JORDAN
Captain, Armor
Combat Arms Training Board
Fort Benning, Georgia 31905

Dear Sir:

I support Major Merritt's Letter to the Editor, "The G Series TOE," which appeared in the September-October issue of *ARMOR*, 100 per cent.

The lesson of full-tracked supply/cargo carriers for armored and mechanized formations was made quite clear during World War II by the Germans. Their armored forces suffered rather badly because of the lack of tracked supply vehicles.

Trucks have their uses of course, but full-track supply carriers belong with full-track armored/mechanized formations. This is a fact, and indeed a very obvious one.

DAVID F. RAITSMA
Yakima, Washington 98901

Seven, Five, Three or Four

Dear Sir:

I realize how much more pleasant it is to be the shooter than the shot at. But, when it comes to the prospect of a three-tank platoon, I must take exception to Captain Kelly M. Morgan's opinions expressed in his article "Tank Company for the 1980s," and *ipso facto*, but more regretfully, those of someone as experienced as General Bruce C. Clarke.

The sophisticated technology of the individual modern tank has, in my opinion, nothing to do with limiting a commander's ability to control various numbers of them. In fact, it may even improve his efficiency in this regard.

I have experienced the whole gamut in 25 years of turret time; three tanks per platoon in the Indian cavalry, five in the British Army and four in the Canadian Army, and am of the latter suasion.

For all our desire to move with the times and be professional forward-looking officers, I do not think we can escape or ignore a basic axiom that has been with us since the discovery of gunpowder; fire and move, and this inherently dictates even numbers!

Thus, while I agree that you cannot/dare not divide a three-tank platoon, it is advantageous in certain rare cases to put two tanks of a four-tank platoon down each axis of a small village for example, or round each side of an obstacle. Even an inexperienced platoon sergeant can cope with a command of that size for short periods.

As far as a company-size group is concerned, my own company was four platoons of four tanks and four in company headquarters, one of which was commanded by a battle captain. With non-runners and shot-ups, we were often down to 16 to 18, below which number a company should not fall and here I agree with General Clarke, although his established figure of 17 seems to have a dangerous lack of cushion. The captain may seem a luxury, but we were frequently augmented by a company of infantry, a platoon of seven scout cars and two helicopters as well as engineers and artillery. All of which meant that someone was needed to run the company, leaving me to command the battle group. In purely armored operations, the captain could be detached with a half company of ten tanks which is a viable force on its own.

Our operations achieved some success, mainly because the platoons were square; that is, four tanks, as was the company. It could be made to fit any plan or any change in attachments, which at times fluctuated almost hourly.

I once married up with infantry on the move, changed formation twice, attacked and bid farewell to the infantry on the radio without even meeting their commander.

With similar flexibility, we once spent a summer exercising the Russian go-go concept of tank/infantry platoon advances at night on widely separated axes. Here I must mention that you cannot easily carry a platoon of infantry on three tanks although admittedly the problem is now somewhat outdated.

We also invariably moved in what was called a standard pattern; in other words, each platoon was always in the same relative position to the others in any formation. This enabled us to attack very quickly from a line of march; a practice at

which the Russians are expert and Western armies mediocre. Therefore, when in column, I could pull a surprise antitank guns right and hope to see the first and third platoons turn right, halt and put down smoke, while the second and fourth made a sweeping right wheel. Hopefully, in less than one minute, the two-up box formation was attacking, with infantry behind the lead elements, without breaking stride. This is a complex tactic for a headquarters and five platoons which does not lend itself to this, the simplest and most basic of armored formations.

There are arguments against the standard pattern system which *ARMOR's* readers will be quick to recognize. A one-up formation, although rarely used, does continually place a particular subelement in the front of the fight. In wartime, this would not be acceptable for long periods but my subordinate officers, for whose opinion I had high regard, seemed to favor this type of drill. It considerably reduced a great problem of armor that is seldom discussed, the eternal confusion that prevails in action or battlefield shambles as it is perhaps better known.

In other words, they always knew which specific platoons were on their flanks, ahead or behind, and could call for or offer fire support with no delay involving consultation of maps or notes. Likewise, specifically numbered infantry platoons always worked with the same platoons of tanks.

As a commander, it was also comparatively easy to produce fast reaction in any situation with an immediate mental picture of the location of four platoons in any routine formation. I defy a commander of five subunits to do this, not only because of the number itself but because the permutation of formations of five platoons is much greater and anyway does not fit the most logical of armored formations; two-up.

Perhaps it is just that I am a bit simple but I do believe a problem exists here, especially when faced with that anticipatory silence that precedes radio orders in an unexpected tight situation. (There is also one more commander who must answer on the air each time!)

I recognize that I am grinding two axes at once; my preference for both four-tank platoons and four-platoon companies as well as routine drills and positions. I would hasten to add that there is a time and a place for unorthodoxy, and have had my moments in this regard.

Perhaps it is just that I don't like threes and fives. In armored deployment I find them clumsy and unwieldy, and in small fire support situations they are, literally, too odd.

The argument will always be with us and I have even listened, patiently I think, to young officers advocate up to seven tanks per platoon, but to my way of thinking, seven is lost, five is over, and Captain Morgan's three is short, but it is my four that is on target.

A. T. HAWKINS
Major, Royal Canadian Armoured Corps
Fort Garry Horse
Training Command Headquarters
Westwin, Manitoba, Canada

Armor Center Commander's Update

MG William R. Desobry

As discussed in previous issues of ARMOR, *the Armor Center Commander's Update is designed to give you a current report of activities taking place at the Armor Center. In this issue I will provide you with an update of items discussed previously and describe some of the newer projects underway.*

The *M60A2* (Update, Jan-Feb 72) has progressed to the Intensified Confirmatory Troop Test (ICTT) which will be conducted by the 1st Battalion, 67th Armor, 2d Armored Division at Fort Hood. The primary thrust of the ICTT will be to determine the adequacy of the support package, training package and MOS skill levels and to identify engineering problems that may emerge as a result of extended usage in a tactical environment. The battalion-size evaluation will be conducted in three phases—training, live-fire and maneuver. The Training Phase (Phase I) will encompass cadre and turret mechanic training conducted at the Armor School and unit training at Fort Hood. The Live-Fire Phase (Phase II) is designed to obtain crew firing performances data and to evaluate the effectiveness of the weapons system when fired by typical troops. The Maneuver Phase (Phase III) allows for battalion-size tactical exercises. Though not the primary purpose of the test, recommendations on doctrinal employment, tactical considerations and possible organizational changes may evolve during testing. I will keep you abreast of the activities in this area as they occur.

The Armor and Engineer Board is scheduled to begin a product improvement test of the *M88* Recovery Vehicle in February 1973. The Product Improved *M88* will include the current production AVDS-1790-2A *M60* series tank diesel engine, the *XM1410* transmission newly adapted to that diesel engine, a diesel auxiliary power unit, an improved dry-type air cleaner, and a new electrical system using the basic electrical components of the *M60A1* product improved vehicle. These modifications will greatly enhance the *M88* in the areas of increased cruising range, compatibility of fuel and spare parts with the *M60* tank, and overall greater reliability, availability and maintainability.

The Armor and Engineer Board is also conducting military potential testing of the *SIMFIRE* Hit-Kill Indicator System developed by the British. *SIMFIRE* is currently used by 14 European and Mid-East countries to simulate main gun firing through the use of the low-power, "eye safe," gallium-arsenide laser. The system allows similarly equipped tanks to engage each other at ranges from 400 to 2,400 meters, and is designed to require correct gunnery procedures to obtain a "kill." When "hit," the target vehicle is automatically disabled by cutting off the electrical circuit. This eliminates arbitrary decisions about which tank was killed since the electrical circuit cannot be reactivated until an umpire physically resets a switch located behind a locked cover plate.

Another vehicle undergoing tests is the High Mobility Wheeled Vehicle—*XR311* (Update, Jan-Feb 72). The military potential test of the *XR311* (Dunebuggy) was completed at Fort Knox in April 1972. The *XR311* proved extremely maneuverable as compared with the *M114* and *M151* in the reconnaissance role, and out performed both of the other vehicles during most phases of the test. Recommended modifications have been applied to the vehicles by the manufacturer to increase their reliability. The vehicles are currently undergoing further testing at Fort Hood.

All major problems with the Gentex *DH132* (Update, Nov-Dec 71) have been solved and, pending a final approval of type-classification Standard at DA level, we hope to have the new helmets in the hands of the troops by mid-summer 1973. This helmet is a definite improvement over the older ones and should go a long way in the prevention of hearing loss.

The Consolidated MOS Study **11E10/11E20** (Update, Jul-Aug 72) has been expanded in cooperation with the other CONARC Combat Arms Service Schools and the Combat Arms Training Board (CATB) located at Fort Benning. Each Combat Arms Service School will study its two high-density MOSs and then in coordination with CATB, identify common skills and knowledge areas. This information will be analyzed in order to produce manuals in three areas to assist enlisted personnel in preparing for the annual MOS Evaluation Test. The three areas are: Fundamentals of Soldiering, including knowledge and skill requirements common to all combat arms, such as first aid; Branch Material, comprising knowledge and skill requirements common to both MOSs within the branch, such as cleaning the *M73* machine gun; and MOS Related, comprising

the knowledge and skills pertaining only to a specific MOS, such as the use of the *M60* tank rangefinder. The Armor portion of the CATB study includes selected duty positions up to and including the platoon sergeant level of MOS **11D** and **11E.**

To simplify the maintenance problem in the area of additional skill identifiers (ASI) for turret mechanics, the Armor School prepared a change in the MOS **45K20** (Update, Nov-Dec 72). The separation within MOS **45K20**, tank turret mechanic, has been approved by DA and is scheduled for implementation on 1 March 1973. The revision will be announced in Change 25 to AR 611-201 and will identify tank turret mechanics at the organizational level as follows: **45N20** for the *M60A1* mechanic, **45P20** for the *M551* mechanic, and **45R20** for the *M60A2* mechanic. This will preclude malassignment of personnel to turret mechanic positions requiring ASI. This action, coupled with an earlier action to identify Armor-experienced MOS **63C40** motor sergeants with the **Q3** ASI, should improve the assignment of Armor-experienced motor sergeants to assist and supervise systems-oriented tank turret mechanics.

The Armor School has recently been designated the proponent agency for the Motor Officer Course, MOS **0600.** This branch-immaterial course is designed to train junior officers in all aspects of maintenance and eventual assignment as battalion/squadron motor officers. The course is currently being revised, using systems-engineering techniques, to insure a complete task inventory and analysis of the requirements of the Motor Officer.

One of the most innovative classes recently included in the Air Cavalry/Attack Helicopter Commander's Training Course at the Armor School is a block of instruction on *Attack Helicopter Battle Drill.* This battle drill unit teaches a series of preplanned immediate action maneuvers by which attack helicopter elements or teams can be trained to accelerate combat action, to enhance teamwork, and to gain or maintain a combat advantage over the enemy without issuing lengthy oral orders. As in all of the classes in this new commander's training course, *Attack Helicopter Battle Drill*, is designed to "teach the teacher." Upon completion, the student will be able to return to his unit and conduct a similar training program, including many of the classes he received here at the Armor School.

Advanced Individual Training, Armor (AITA) within USATCA at Fort Knox is taking on a new look. Several new programs are in their formative stage and are designed to provide the Army with personnel trained in the skills required to be crew members on our newest Armor equipment.

This spring, the 1st Training Brigade is scheduled to receive *M60A1s* with add-on stabilization. It is anticipated that personnel destined for assignment to Germany will remain for an extra week of training following completion of the normal seven-week AITA MOS **11E** Course to become familiar with the stabilized version of the *M60A1*. The training prepares the individual to perform crew duties while operating the stabilized *M60A1* on the move, and gives a complete orientation on turret operations and conduct of fire.

The 1st Training Brigade also now trains MOS **12A** graduates of Fort Leonard Wood AIT to operate the Combat Engineer Vehicle (CEV) *M728* and the Armored Vehicle Launch Bridge (AVLB) *M60* in a seven-week course which qualifies them in MOS **12F.** In order to reduce overall training time and eliminate an unnecessary inter-post transfer, this course is being modified to add basic engineer subjects such as bridging, pioneer tools, demolition and field fortifications. Under the new program, BCT graduates will be assigned directly to the 1st Brigade for a ten-week AIT course and will be awarded MOS **12F** upon graduation. The new system reduces total time in training by seven weeks.

An *M60A2* training company will be activated at Fort Knox late this spring. A training program, still in the formative stage, will, like the *M60A1* MOS program, be conducted for selected AITA graduates. A four-week program will include both missile and conventional gunnery techniques. The *M60A2* crewman will be awarded MOS **11E10W1.**

Reports received from the field indicate personnel who have received unique training within the 1st Training Brigade have not in all cases been assigned to positions requiring their skills. Watch for personnel with these MOSs and identifiers and don't waste their talents.

- **11E10R8** — *M551 Sheridan* Crewman
- **12F20** — AVLB/CEV Operator
- **11B1U/11C1U/11D1U/11E1U** — *M113* Operator
- **11E10W1** — *M60A2* Crewman

WHY TANK HEAVY FORCES IN EUROPE

BY
MAJOR GENERAL WILLIAM R. KRAFT JR.

General James H. Polk's article in the July-August 1972 issue of *ARMOR*, "We Need A New Tank," describes most articulately the dilemma facing the US Army as it moves well into the 1970s armed with a tank developed in the 1950s. There would be much less cause for concern about this if we were not committed to provide forces for the defense of NATO territory in Western Europe. The Warsaw Pact armies which threaten NATO are well endowed with excellent tanks, mechanized infantry, mobile artillery and an array of supporting ground and air formations, giving them a strong capability to move a tremendous amount of firepower at a relatively rapid rate. Moreover, the terrain of Western Germany from the Interzonal Boundary to the Rhine offers few serious obstacles to an attacker possessing such mobility. The lack of natural barriers to the movement of mechanized forces precludes NATO from seriously considering any but a mobile type of defense. I believe this would be true even if NATO were to increase the size of forces readily available on the ground.

Our doctrinal manuals for years have described how a mobile defense should be conducted. The battle is joined first by the covering force cavalry to gain time for tanks, Infantry, Artillery and Engineers in the forward portion of the main battle area to get into position and emplace barriers. Tank-heavy strike elements position themselves in dispersed formations well to the rear of the FEBA, from where they can move swiftly over multiple routes to any threatened portion of the battle area. As the enemy pushes in the covering force and attempts to breach the barriers in order to penetrate the forward portion of the battle area, he would be engaged by an array of antitank weapons and by artillery, helicopter gunship and tactical air fires. Major Joseph D. Keyes, writing in the July-August 1972 issue of *Infantry* in "Tactics for the Force-Oriented Defense," describes very well how this forward battle might be fought by mechanized infantry forces liberally endowed with light antitank weapons. He very wisely stresses that these forces should be oriented upon the enemy rather than upon the terrain.

There is no doubt that determined FEBA forces should exact a heavy toll on the enemy's first echelon through the use of antitank weapons,

barriers and well-directed air and artillery fires. But, Soviet military writers assure us that they would anticipate this type of resistance and thus are prepared to follow initial attacks with succeeding armor echelons to wear down the FEBA position.

If the FEBA battle is fought skillfully, perhaps in the manner suggested by Major Keyes, attacking enemy armor waves might well be canalized into areas where a decisive blow by the strike element is possible. At this point, the initiative possessed by the attacker can be seized by the defender if his strike elements in terms of battalions of tanks are well positioned. By carefully calculating the time and place of his massive tank strike, the defender has the opportunity to inflict a decisive blow on the attacker, who may well find himself on unfavorable ground, low on ammunition and fuel, and perhaps even lost if the visibility is poor (as it is much of the year in Germany).

There is nothing novel about the tank-heavy strike force concept. It was first proposed by Charles de Gaulle in the 1930s. He urged the French government to organize an elite strategic reserve of seven armored and mechanized divisions containing about 3,000 tanks supported by mobile artillery which, attacking from rearward positions on an average front of 50 kilometers, could engage German armor penetrations.

As we well know, de Gaulle's concept fell upon deaf ears in France, but he did have the satisfaction of showing its validity in a small way in May 1940. Toward the middle of that month, five German panzer divisions had broken through the French defenses along the Meuse, north and south of Sedan, and were rolling northwestward toward the Channel. Although the French possessed a substantial number of tanks, they had been scattered along the front supporting the infantry, and at no point were they numerous enough to cope with such a concentrated German armor attack.

On 11 May, de Gaulle was summoned from a staff position and put in command of the 4th Armored Division, which then existed in name only. Near Laon, south of the German penetration, he gathered three battalions of tanks, each battalion equipped with a different model, and an infantry battalion which had arrived in buses. On 17 May, he launched his 150 diverse tanks and infantry northward into the southern flank of the German attack and enjoyed a surprising measure of success, even though his hastily formed force had virtually no maintenance or logistic backup. Before having to halt due to mechanical breakdowns and lack of fuel, de Gaulle's relatively meager force had advanced well into the rear of the 1st Panzer Division and caused considerable confusion. De Gaulle describes this battle in the first volume of *Mémoires de Guerre*, pages 31-34. This modest success seemed to point to the soundness of de Gaulle's concept, and it is interesting to speculate on what might have happened had the French organized the 3,000 tanks available to them in 1940 into an armor strike force.

Later, in December 1944, during the Battle of the Bulge, US armored divisions showed in dramatic fashion how tank-heavy strike forces can wrest the initiative from an attacking armored enemy. For example, *The Battle at St. Vith, Belgium*, a US Armor School publication, describes in detail how the US 7th Armored Division halted the 5th Panzer Army at St. Vith.

During the years since World War II, the value of the tank in the strike role has been enhanced not only by improvements in the mobility and firepower of the tank itself but, equally, by improvements in the capabilities of the other members of the Armor team.

As new, light tank-killing weapons have become available to the Infantry, our mechanized battalions have become less dependent upon tanks to sustain them in the FEBA battle. Artillery has been upgunned and made more mobile, thereby increasing its effectiveness throughout the battle area. Engineers with improved equipment can now lay mine fields faster and emplace barriers better. At present, we have *Chaparral, Vulcan* and *Redeye* and no longer have to rely almost solely on the .50 caliber machine gun for defense against low-flying aircraft. To these should be added the many improvements in communications equipment, battlefield surveillance means, and logistic and maintenance support.

Far from degrading the tank as the key element in the mobile defense, the materiel and organizational improvements in the other arms have strengthened the credibility of its role. These improvements give a higher assurance that our tanks will be able to get to the right place at the right time and in sufficient numbers to seize the initiative on the European battlefield.

One might speculate on how the

mobile defense scenario would be modified by a decision on the part of either side to employ tactical nuclear weapons. There is little doubt that an advantage would accrue to the side first using tactical "nukes." If, as a worst case for us, the aggressor were to use nukes initially to facilitate his attack, the advantage to him would probably be conditioned by how well the defender is able to disperse and protect his forces. The mobile defense dictates that FEBA forces be relatively dispersed, which would give them a significant measure of protection. Tanks in the strike force would be doubly protected by dispersion and heavy armor. On the other hand, as the attacker masses to follow up the advantage he has gained through initiating the employment of nukes, he presents a vulnerable target for the defender's fires and a follow-up attack by the defending strike force. If this logic is accepted, the presence of dispersed tank-heavy forces as part of a mobile defense array might well give an attacker second thoughts on starting a tactical nuclear exchange.

While for many this discussion may be academic, it has real meaning for those of us in the divisions of 7th Army who live and train on the terrain which we might have to defend. As we wargame the battles which might be fought, the decisive role of the tank becomes quite apparent. Yet, there is also the realization that without the tank-killing capability of the Infantry, the supporting fires of the Artillery, the protection afforded by *Chaparral, Vulcan* and *Redeye* and the many capabilities of the Engineers, the tank could not fulfill its role. In other words, without the tank, the mobile defense is meaningless, but without the concurrent effort of the other arms the tank is powerless.

MAJOR GENERAL WILLIAM R. KRAFT JR. was commissioned in Cavalry from the US Military Academy in 1942. He served with the 15th Cavalry Regiment during World War II. In 1951, he commanded the 66th Tank Battalion of the 2d Armored Division. From 1954-1957, he served in the Office of the Chief of Legislative Liaison, followed by attendance at the Naval War College. In 1959, he organized the Royal Staff College in Saudi Arabia. General Kraft was assigned to Armor Branch from 1959-1962. After attending the Army War College in 1962, he served with the 3d Armored Division as commander of Combat Command A, and later as G3 of V Corps. In 1967, he became director of the Western Hemisphere Region of the US Army Element, Office of the Assistant Secretary of Defense (International Security Affairs). General Kraft then served in Vietnam as assistant division commander of the 9th Infantry Division. In 1970, he assumed command of USAREUR and 7th Army Troops. General Kraft is currently commanding general of the 3d Armored Division.

ASSAULT BRIDGING FOR ARMOR SUPPORT

By Lieutenant Colonel Garland J. Reid

Tankers and Engineers have long enjoyed a close working relationship, due to the combat support provided by Engineers, which enhances the speed and mobility of Armor and mechanized units. Prior to and during the Civil War, long before the advent of modern Armor, the Cavalry was assisted by bridges and ferries built by Engineers.

Although the tank has good cross-country capability, its mobility is restricted by certain terrain obstacles; the most significant of these being wet and dry barriers. In an ideal situation, the assault forces would negotiate these barriers by utilizing existing bridges, or by swimming and shallow fording. Since this is not always possible, Engineer bridge units are organized and equipped to expedite the movement of Armor units across these gaps and to prevent loss of momentum. These units may be equipped with fixed or floating bridging equipment capable of supporting tracked vehicles.

CURRENT BRIDGING EQUIPMENT

Float bridge companies may be equipped with *M4T6*, Class 60 or Mobile Assault Bridging (MAB) equipment. The *M4T6* and the Class 60 bridges are extremely versatile, as components of both may be employed as rafts or fixed span bridges. The Class 60 bridge was designed and developed immediately after World War II to accommodate heavy and wider-based wheel and track vehicles. The 24-ton pneumatic float, with increased hydraulic characteristics, was another feature of the design of this bridge. However, these important advantages were offset by the inability of the bridge to be assembled without a cumbersome crane.

By combining the best features of the Class 60 and the all-aluminum *M4* bridge used extensively during World War II, the *M4T6* bridge was developed. The 24-ton pneumatic floats of the Class 60 bridge were adapted to the aluminum balk superstructure of the *M4*, making components of the *M4T6* extremely light and hand erectable.

While both bridges have been used successfully in the past, they simply do not fulfill all of today's requirements for bridging equipment because of the large number of vehicles required to transport them (15 feet per vehicle). Further, large numbers of combat engineer troops are required, and the assembly process is slow.

The Mobile Assault Bridge (MAB), recently provided to our forces in Europe, eliminates many of the shortcomings of conventional bridging equipment. It was designed to operate with assault elements and can be used to assemble bridges or rafts at the rate of approximately 400 feet per hour. It is essentially an amphibious transporter with a bridge superstructure mounted on it.

The vehicle has a land speed of up to 40 miles per hour and can enter the water directly. Upon entering the water, power is transferred from the drive wheels to the marine propelled unit. The superstructure is then raised, rotated 90 degrees, and

Ribbon Bridge

Mobile Assault Ferry

Mobile Floating Bridge

Medium Girder Bridge

connected to form bridges or rafts. The introduction of this bridge was a significant departure from the conventional bridging concept in that bridge companies no longer require outside combat engineer troop support for bridge assembly. Although this bridge is extremely effective, it is also expensive.

There are currently two standard fixed bridges in the Army inventory: the *Bailey* Bridge; and the Armored Vehicle Launched Bridge (AVLB). The *Bailey* is a hand-erectable panel bridge designed primarily to span dry gaps. However, like the conventional floating bridges, its assembly is time consuming, and large numbers of vehicles and troops are required for transportation and assembly. The AVLB is transported, launched and retrieved by a modified turretless tank. The bridge accompanies the assault elements, and can be readily used to cross gaps of up to 60 feet in a minimum of time with minimum exposure of bridging personnel to enemy fire. With the introduction of lightweight, high-strength materials, it is highly possible that the span could be extended to 90 feet.

FUTURE BRIDGING EQUIPMENT

With the continuing emphasis on conservation of funds and mobility, future bridge systems must be inexpensive, speedily assembled and disassembled, and require less overall manpower resources. Future systems should also permit the bridge unit to be hauled, maintained, assembled and disassembled without additional troop assistance. Two promising bridges, the Medium Girder Bridge (MGB), designed to span dry gaps, and the *Ribbon* Bridge for wet gaps, will meet most of these requirements.

The Medium Girder Bridge, developed by the British as a replacement for the *Bailey* Bridge, reduces the erection time, labor requirements and amount of transportation for bridge spans of comparable length and capacity. A 100-foot span capable of supporting Class 60 loads can be installed by 30 men in less than two hours. A reinforcement

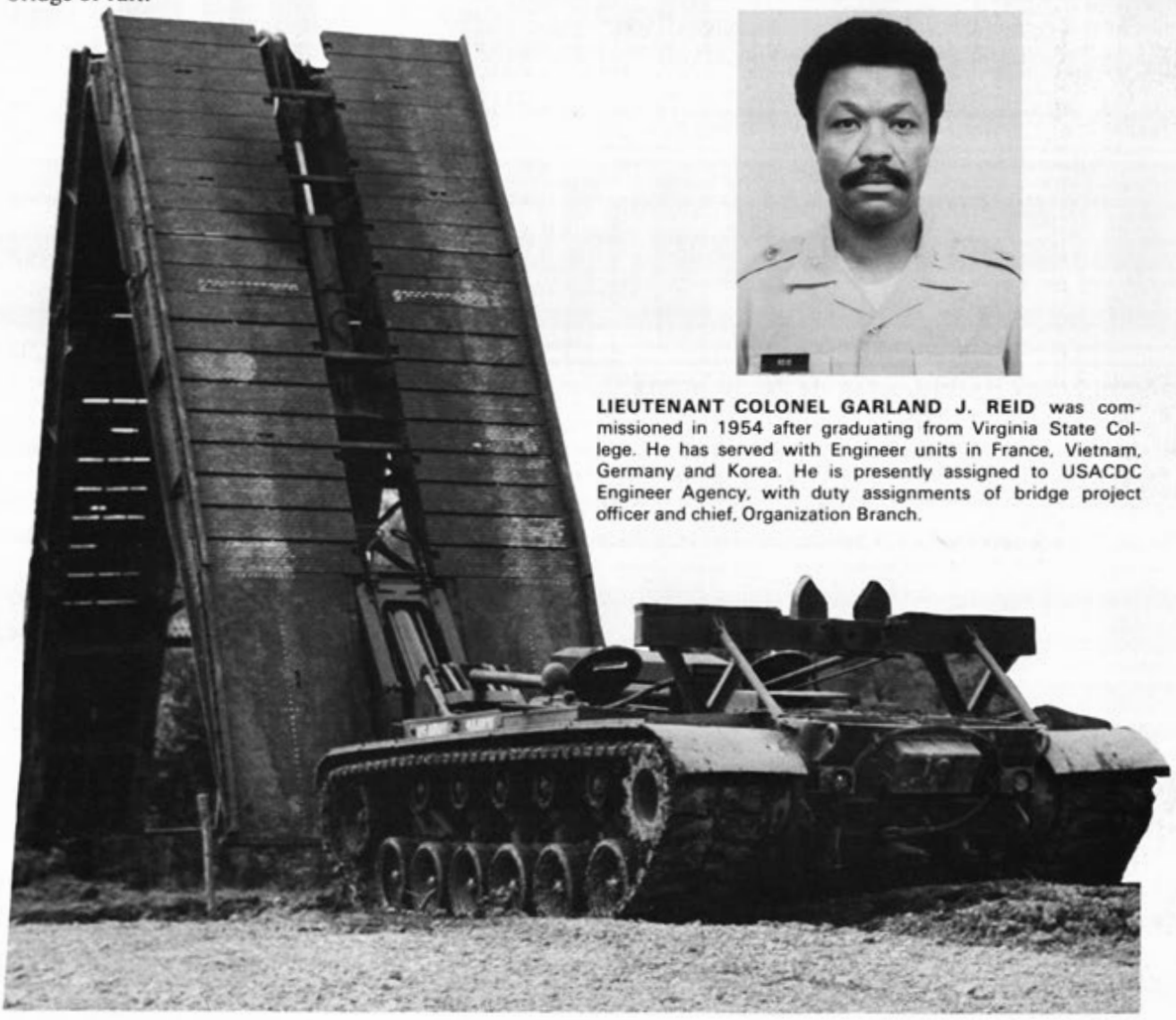
kit is being developed which will permit the extension of the maximum span length to 160 feet. A pier is also being developed to provide a multiple span capability. The MGB is the leading candidate to replace the *Bailey* as the standard tactical dry gap bridge in the Army inventory.

The *Ribbon* Bridge was developed to complement the Mobile Assault Bridge (MAB) and to replace the *M4T6* and the Class 60 bridges. It is a continuous, floating modular bridge with integral superstructure and floating support capable of supporting Class 60 loads. A completed *Ribbon* Bridge consists of a ramp bay at each bank and the required number of interior bays between the ramp bays. The bays are carried in a folded condition on a modified 5-ton truck which launches and retrieves them. When launched, the bays unfold and are pin-connected to form the span. These spans are then moved into position by bridge erection boats to form the completed bridge or raft.

Tests of the prototype *Ribbon* Bridge revealed that it far exceeds the *M4T6* and Class 60 bridges for rate of construction and conservation of troop effort, while providing equivalent river crossing capabilities. During tests, the average time to construct 357 feet of ribbon bridge with a work crew of 63 men in flowing water was 1 hour and 50 minutes. A comparable length of *M4T6* bridge would require 259 men five hours to assemble.

Although substantial progress has been made in the field of military bridging, much work remains. Several national and international bridge studies are currently being conducted to address many important aspects of military bridging. The results should lead to a family of military bridging that will provide the future Engineer with the best possible methods of meeting the increasing demands for mobility of the armored and mechanized forces.

LIEUTENANT COLONEL GARLAND J. REID was commissioned in 1954 after graduating from Virginia State College. He has served with Engineer units in France, Vietnam, Germany and Korea. He is presently assigned to USACDC Engineer Agency, with duty assignments of bridge project officer and chief, Organization Branch.



By Colonel Walter F. Ulmer Jr.

Notes On Enemy Armor At An Loc

PHOTOS BY SSG THOMAS P. DARLING

The North Vietnamese attacked Binh Long Province from Cambodia in early April 1972 with armor, antiaircraft and artillery representative of conventional mid-intensity warfare. Today, 36 Soviet-made tanks—most of them the 100mm gun *T54* model—remain within the town of An Loc. They were destroyed between 13 April and 24 May. Dozens more remain scattered in various stages of destruction along the approaches to the town.

During the battle of An Loc, the North Vietnamese were skillful in the use of artillery, aggressive in antiaircraft techniques, but notably amateurish in the employment of armor. Their hesitant, uncoordinated fumbling with some well-maintained Soviet vehicles showed once again that successful armor employment is totally dependent on aggressive spirit and technical skill on the part of the tank crews. Also essential is a confident understanding of mechanized warfare by platoon leaders and company commanders.

Over 100 armored vehicles operated over the hard dirt trails, through the rubber plantations, and along the reasonably trafficable open countryside of Binh Long Province. However, these vehicles made an insignificant contribution to the real combat power of the three North Vietnamese divisions which were badly mauled in the campaign. The initial appearance of tanks in force on the battlefield created psychological shock waves. But with rare exceptions thereafter, the presence of enemy armor in varying states of disarray resulted in significant psychological bonuses for the defending ARVN forces.

The close-in destruction of *T54* and *PT76* tanks in An Loc is a tribute to the skill and courage of many ARVN soldiers. It is also a graphic commentary on the soundness of tank warfare, as developed and taught by the US Army Armor School. Or, more specifically, it indicates that if the principles and techniques of dynamic mobile warfare are ignored, expensive mechanical marvels can be quickly reduced to ignominious rubble. There was nothing more uplifting to the morale of the defenders at An Loc than the sight of an enemy tank exploding at close range.

Tanks attacked An Loc on three occasions. They were involved in the major multi-directional thrusts against the town on 12-14 April and 11-13 May. The final use of tanks was on the night of 23 May when six came up Highway 13 from the south. The largest formation attacking on a single axis was a group of 12 *T54* tanks.

In addition to these three efforts, tanks in groups of two or three, and sometimes other armored vehicles such as the open-topped, twin-gunned *ZSU57/2*, rumbled around the outskirts of town and, now and then, eased through the night from camouflaged positions into the lodgments which the NVA held in An Loc from mid-April until mid-June. Probably less than 100 armored vehicles were deployed against the 5th ARVN Division and the several major units attached to it during the April-May battle. Between 75 and 85 were destroyed on the Binh Long battlefield.

These notes and photographs provide a sketch of selected aspects of the enemy's use of armor in one particular location.

Looking north, down what was earlier a street of homes and small shops in the northern section of the town . . . In the background is one of the several small hills which afforded the enemy excellent observation into An Loc. From such convenient terrain, the 5th, 7th and 9th NVA divisions with supporting artillery organizations directed several thousands of rounds per day for several weeks into An Loc. The lead tank in the photo was the first enemy vehicle destroyed in the town. On 13 April, this *T54* was among 11 others which came over the high ground in the background in two line formations of six tanks each. Infantrymen were riding the tanks. Alerted the previous day to the presence of tanks, the artillery planned several concentrations on the approaches at the edge of town. The 8th ARVN Infantry Regiment formed 24 three-man tank-killer teams. Two men had several *M72 LAWs* each and the third carried an *M16* rifle.

As the tanks neared the edge of town four 105mm howitzers fired ten rounds per tube in one of the preplanned concentrations. Approximately 15 of the enemy infantrymen were killed; the rest stumbled from the tanks and took cover as the tanks kept moving forward at about 10 miles per hour.

The second and third tanks in the photo were knocked out two days later by *M72s* fired from inside buildings on both sides of the street. Many rounds hit these tanks. They did fire bursts from their coaxial machine guns, traversing the turrets slowly a few degrees right and left of front center. The second tank in the photo was one of the very few that ever fired the turret-mounted machine gun. It also stopped and fired a single round from the main gun. After the tanks were immobilized, the drivers exited through the escape hatch in the hulls and the other crewmen were killed by small arms fire as they climbed out of the turrets.

Tank-killer teams took positions in the northwest portion of town, mostly in the second floors of the buildings. On entering the town, the tanks split up and lumbered south along the streets. By this time, the tanks were buttoned up. As a tank crawled up the street, the soldiers in the building began shooting their *M72s*. The first few missed, but the tanks did not fire. Then, from atop the three story building which was the regimental command post, First Lieutenant Chi, assistant S3 of the regiment, fired an *M72* at a range of 20 meters. It killed the driver as the round penetrated behind and slightly above the left front roadwheel. The other crewmen bailed out of the turret hatches and were killed by *M16* fire.

Crewman in immobilized but otherwise operable vehicles rarely used their tank weapons immediately after being hit. However, the NVA infantrymen or tankers often reoccupied dead tanks along the perimeter at night, and used them as weapons emplacements or forward observation points.

Most 105mm howitzers had 2-3 rounds of HEAT at the gun positions on 12 May. Probably a HEAT round through the turret disabled the *PT76* which was later destroyed by *M72* fire.

Not all tanks came into An Loc buttoned up. One group of tanks approached town lackadaisically with all hatches open. They were taken under fire by mortars at the edge of town and later destroyed inside An Loc. A prisoner of war said that they were told the town had been taken and no resistance was to be expected!

In both the 13 April and 12 May attacks, tanks and infantry became separated. Mortars fired on the tanks, and the infantry atop them dismounted. The tanks sped up, leaving the infantry crouched in shell holes along the roadside. Apparently, one plan of attack was for tanks and infantry to take separate axes of advance from an assembly area a few kilometers behind the assault position. There, they would go in for the final move into the perimeter. But their timing was off. The tanks and infantry assaulted separately, at least 30 minutes apart.

On 12 May, Rangers attached to the 5th Division saw several *T54* tanks moving toward town along Route 303 from east of An Loc. There was one point where the route crossed a stream by way of a narrow concrete bridge. The Rangers, accompanied by a US advisor, devised a bold scheme: knock out the lead tank exactly on the bridge; thereby creating a major obstacle. The Rangers moved to within 30 meters of the bridge and waited on both sides of the road with *M72s* ready. As the lead tank reached the middle of the bridge, six *M72s* hit it. The vehicle was destroyed in precisely the right spot.

The attack on 12 May was preceded by an intense artillery preparation. The tanks entered the town without infantry, yet the artillery was lifted as the tanks moved in—permitting the defending infantry to move out of their bunkers and shoot into the hulls at close range. In both attacks, the tanks moved slowly, stopped frequently, and the crews appeared disoriented.

At noon on 15 May, Sergeant First Class Cao Tan Tai of the 8th Regiment was in position on the roof of a building, and was credited with destroying two *T54s*. He hit his first from a distance of ten meters. The *M72* round hit the front part of the turret and somehow ignited ammunition inside the tank. His second kill was made when he first immobilized the vehicle with a shot into a front roadwheel. He then fired second and third shots at the turret from a range of 20-30 meters. One round blew off the machine gun and detonated its ammunition. Both tanks started to burn and two crewmen inside were killed by fire. Again, the drivers exited through the escape hatches. They were killed by small arms fire. Neither tank fired a round in sight of Sergeant Tai, and were buttoned up when they came into view.

All tanks came into the town without external fuel drums. Many ran out of fuel before they expended their ammunition.

Artillery direct fire was credited with several tank kills in An Loc. This tank lost its turret when infantrymen dropped 155mm powder bags inside the hatch and ignited them with grenades which blew up main gun ammunition. Earlier, the tank was taken under fire by a 105mm howitzer firing charge seven at 150 meters range. The gunners did not have their direct fire sight mounted so they took aim by looking along the top of the tube. The tank returned fire with its main gun and the chief of the section was killed. The crew kept firing and scored the first hit with HE, fuze quick, at 50 meters range. After being hit, the tank made a quick turn to the right, moved a short distance, and with the engine still running, was abandoned by the crew.

Twenty members of an NVA unit were inside this *BTR50-PK* when it was destroyed.

Fighter aircraft knocked out this *ZSU57/2*.

This hulk stands by the south gate of town. It rolled in from the north, ambled two kilometers down Highway 13, which is the north-south street, and started to leave town headed south. Along the way, it stopped to fire a few rounds into the 5th Division command post from a range of 75 meters. It was taken under fire by a 105mm howitzer and hit with two rounds of HEAT at a range of 20 meters. The tank was disabled and the excited gun crew pumped a total of 50 rounds of HE and smoke into the vehicle, totally destroying it.

This *T54*, shown on Highway 13 along the rubber trees about one kilometer south of An Loc, was probably part of a small probe on 23 May. At that time, six to eight vehicles came north in column without infantry or artillery support, moving relatively slowly. About 45 minutes after the tanks were detected, they were engaged by *F4* aircraft with 500-pound bombs. Two or three of the tanks were caught on the road. *M72* and *XM202* antitank weapons knocked out the others. This tank was stopped, and the crew assumed to be dead. Two airborne soldiers mounted the tank. Just at that time, its engine started and the vehicle moved out! After some hand wrestling with the tankers who were tugging from inside, the hatch was pulled open and a grenade was dropped in, killing the crewmen.

The turret of this *T54* was displaced from the turret ring by the force of an explosion inside the vehicle. Fighter aircraft were responsible for the kill.

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Several tanks became stuck in craters made by 1,000-pound bombs.

After this *PT76* was stopped by either a *Spectre* or *Cobra*, it was destroyed by *M72* fire.

These notes may provide some insight into enemy armor operations on the Binh Long battlefield. There are obvious lessons to be learned from enemy tactical errors. However, the inadequacies of the NVA armor should not be extrapolated to broad generalizations without a careful analysis of the total picture of the Binh Long campaign. But in any case, there is ample testimony to the courage of many ARVN soldiers, and to the necessity of competent and aggressive leadership for successful armored warfare.

The Evolution of the Tank Fire Control System

By Samuel Feinstein

The *M60A1* is presently undergoing a product improvement program that will optimize its combat-effectiveness and will increase the cost-effectiveness of the tank fleet. One of the key elements of this program is a new full solution laser tank fire control system (LTFCS). This system is the result of an orderly evolution in fire control equipment carried by tanks.

The equipment used by the gunner to control the aiming of the main gun in US tanks at the end of World War II was a rudimentary optical sight consisting of a V-shaped reticle for stadiametric ranging. If the gunner knew the size of the target, the reticle would allow him to enter a super-elevation correction into the gun line.

A relative figure of merit can be established for such systems based on a quasi-combat mathematical model. The probability of a first round hit (*PH1*) is predicted to be 0.5 at about 900 meters for a medium velocity projectile fired at a typical target size. At ranges beyond 900 meters, the hit probability drops off so steeply as to cause the gunner to hold his fire in order to conserve ammunition.

In the 1950s, a stereo-optical rangefinder and a cam-operated ballistics computer were added to an optical sight. This combination yielded an appreciable improvement over the simple V-shaped reticle. The *PH1* for a standing target is 0.5 at about 1,300 meters.

By the end of the 1950s, the stereo-optical rangefinder was again improved. An electro-mechanical ballistics computer solved the aiming problem both in azimuth and elevation; a reticle projector was added to the optical sight; and, a cant sensor was introduced to measure gun trunnion roll. With this combination, a *PH1* of 0.5 is predicted at 1,400 meters.

For all of these systems moving targets proved to be an additional complication. The gunner had little help from his fire control equipment, and even the best obtained discouraging results.

Tank fire control equipment was still archaic as compared to the equipment carried by aircraft at that time. There was a very good reason. The most important imput to a ballistics computer is range. Due to ground clutter, radar rangefinders were useless for tanks. And, as long as the optical rangefinder limited the accuracy of range determination and was such a time-consuming procedure, it hardly paid to modernize the system.

However, the advent of the laser rangefinder revolutionized tank fire control systems. It provided

an extremely accurate method to determine distance with no degradation out to the limits of the gun range. Not only was accuracy obtained, but range was determined practically instantaneously and tank personnel did not have to receive extensive training. Hughes has been active in developing tank laser rangefinders for both domestic and overseas applications since 1964.

THE MODERN RANGEFINDER

During the mid-1960s, a program was begun to modernize the tank fire control system to take full advantage of the laser rangefinder. All the terms of the ballistics equations were examined and attempts were made to develop a system capable of incorporating all factors. Non-standard conditions such as air and initial projectile velocity are accounted for, and the computer receives inputs of propellant temperature, air temperature and pressure, and gun wear. Since the computer determines time-of-flight of the projectile, a crosswind sensor provides wind trajectory corrections; and a sensor measuring the tracking rate provides a moving target solution. If a stabilization system is added, then a shoot-on-the-move capability can be provided.

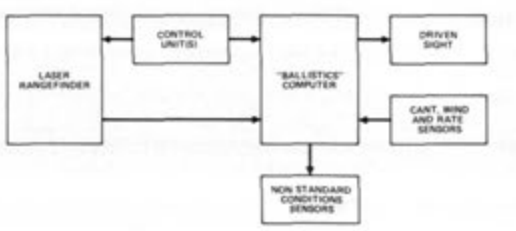
With this full solution laser tank fire control system, a *PH1* of 0.5 at 1,700 meters is predicted. This approaches the maximum possible *PH1*. However, even a perfect system cannot correct for errors that are random in nature. For instance, the gun jumps when fired. For each type of ammunition fired a fixed amount of gun jump can be zeroed out, but there is some variation in the amount of gun jump from round to round that is not predictable. There is also a random dispersion of the impact point of the fired rounds, despite the tight tolerances held in the manufacture of ammunition. And, of course, there is an element of human error within any system.

The first opportunity to demonstrate the performance of the LTFCS came in late 1966. Belgium had not yet decided which tank to procure for its armored force, but they were determined to field a tank that was optimized, both as to combat- and cost-effectiveness. A licensee in Belgium (Sabca) was chosen as prime contractor and system integrator. Hughes Aircraft designed the system and built the demonstration computer. A German licensee (Eltro) supplied the laser rangefinder. The *M47* tank was used as the test vehicle, and the system was evaluated at the NATO firing range in Bergen-Hohne, West Germany.

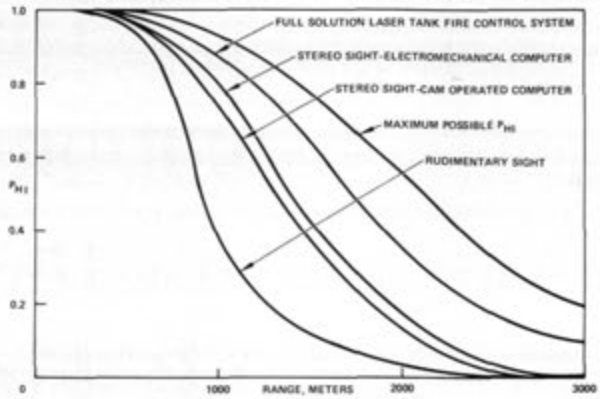
During a two-year period, a series of 7 two-week trials were run. The test was not conducted in combat conditions, but neither were conditions ideal. Zeroing was done only on the first day of the two-week period. The weather varied from summer days to rain, fog and snow. Temperatures ranged from 10 to 92 degrees, and winds were encountered from all directions with maximum velocities to 29 knots. The gunner never fired at a fixed target twice in succession, and the moving targets were towed in alternate directions at 10 to 12 kilometers per hour.

Using high velocity ammunition and with more than 100 rounds per target, an actual hit percentage of 0.5 was achieved at ranges beyond 3,000 meters. For moving targets, a 0.97 actual hit percentage was

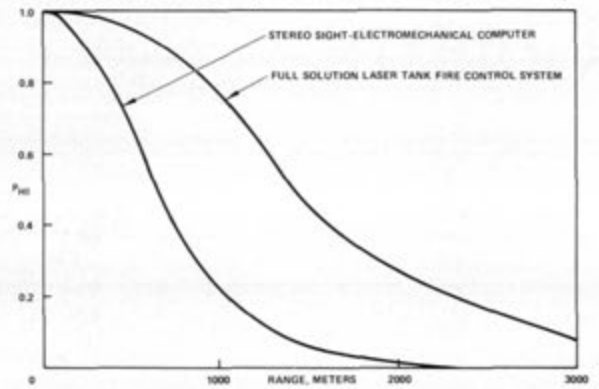
FULL SOLUTION LASER TANK FIRE CONTROL SYSTEM



STATIONARY TARGET (2.3 METERS × 2.3 METERS)

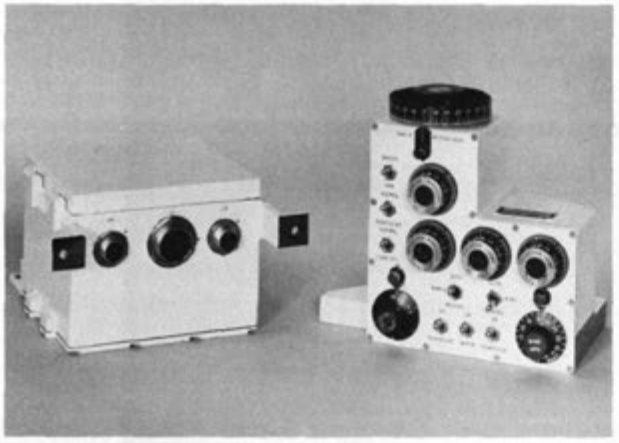


MOVING TARGET (2.3 METERS × 4.6 METERS)



achieved at 1,800 meters. The Belgians reported to a NATO panel that "we have doubled the first round hit probability over the range of interest, or we have effectively doubled the range for a given hit probability."

In 1968, Frankford Arsenal sponsored the development of the first solid-state analog tank fire control computer for application with a previously procured laser rangefinder. Although there was no specific tank need at the time, the Arsenal wanted to establish that a ballistics computer could be developed with no moving parts and capable of being



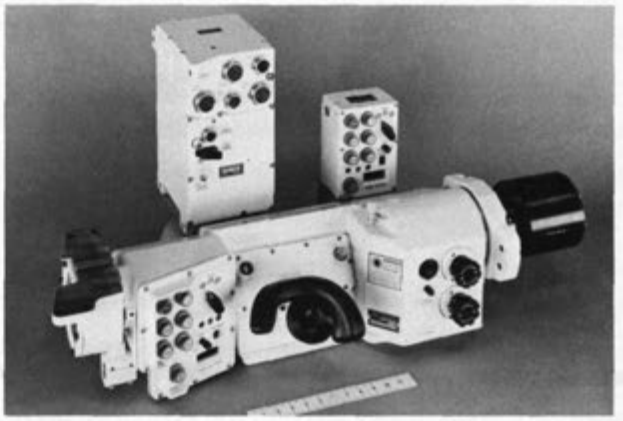
hard mounted in tanks. The computer was designed to be functionally interchangeable with an existing electro-mechanical computer. The resulting computer was less than one-third the size of the electro-mechanical equivalent and had a calculated mean time before failure seven times greater. Performance, using grid boards on the range, was extremely satisfactory. Unfortunately, the opportunity for actual firing trials has not yet presented itself.

In 1969, the Belgian Army decided to procure the German *Leopard* tank, to be fitted with a prototype laser tank fire control system. The computer design drew heavily on the previously developed solid-state computer from Frankford Arsenal. The results at the firing range were equivalent to those achieved with the *M47* demonstration system. Belgium has now placed a production order for this LTFCS.

THE M60A1 LASER

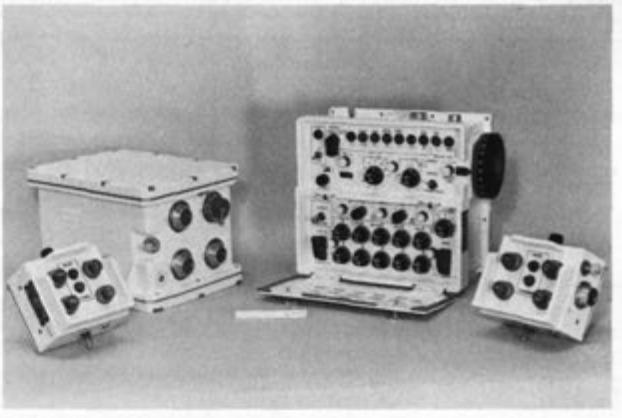
A major milestone in US tank programs is the *M60A1* Product Improvement Program. The full solution laser tank fire control system designed for this program draws on the experience derived from the Belgian *Leopard* tests. It satisfies the requirements set forth by the *M60* Program Manager's Office (representing the coordinated view of the Armor Community) and Frankford Arsenal. Preproduction prototypes are being delivered and there will be a thorough evaluation before production starts.

The laser rangefinder subsystem is composed of three main units. The lower assembly in the photo-



graph is the commander's integrated laser sight and control unit. Range may be fed automatically to the computer or, if more than one return is received, the commander may select the range return based on his assessment of the situation. Upper left is the laser electronics unit. Upper right is the gunner's laser control unit. Since the gunner's sight is boresighted with the laser rangefinder, either the commander or the gunner can fire the laser and/or the gun.

The fire control system includes the ammunition select units, the computer and the gunner's control unit. At the left and right of the photograph are the two ammunition select units. The commander or



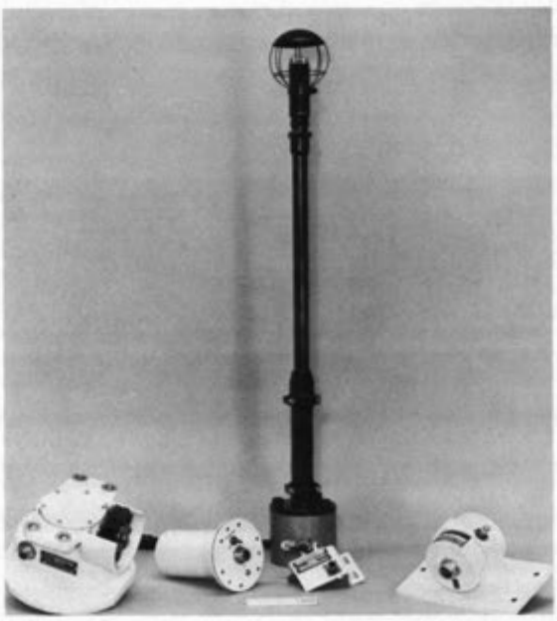
gunner may select one of the four basic types of ammunition to be used. Actually, the computer stores solutions for nine ammunitions within the four basic types to accommodate ammunitions stored in different geographical locations. The switch at the bottom of the unit is used to set up either tank moving or stationary conditions.

The second unit is a solid-state hybrid computer. It processes all the imput data and commands the

sight lines for laying the gun. Its mean time before failure is calculated to be 2,000 hours.

The top half of the gunner's control unit panel contains three manual imputs: air temperature; pressure altitude (slowly varying inputs, not required to be very accurate); and manual range in the event of laser failure. All other sensors are automatic. There is a counter that displays the number of effective rounds fired so that the gunner may determine when the gun tube needs replacement. Since the amount of wear on the gun tube depends upon the type of round fired, a wear factor is assigned to each ammunition type. This is known as effective full charge (EFC). A circuit associated with the EFC counter corrects the ballistics solution for gun wear. The row of lights at the top of the unit is for self-test. Either a green "Systems OK" light is lit, or a light comes on indicating which unit is faulty. A red light indicates failure of the system. An orange light indicates that the system will continue to function, but with degraded accuracy. This self-test system removes the trouble shooting burden from the tank crew, and unit replacement in the field is easily accomplished. The bottom half of the panel (normally covered) is used for boresighting, zeroing, manual crosswind input (if desired) and a switch to select the ammunition within the four basic types.

Automatic sensors feed data directly into the computer. From left to right in the photograph, they are:



- The rate unit—used against moving targets from a stationary tank. When the tank is moving, this unit (which is most accurate when the tank is stationary) is switched out and replaced by input from the gun stabilization system gyros, since inertial tracking rates are required.
- The propellant temperature sensor—has a thermal time constant to match the typical ammunition.
- The crosswind sensor—can be stowed horizontally and is spring mounted to prevent damage when the tank encounters low branches. Since this is the only unit not under armor, a circuit in the computer continuously monitors the crosswind sensor output and switches to manual input in the event of failure.
- The EFC switch—senses rounds fired. Its output is combined with the ammunition selection information to determine gun wear.
- The cant unit—senses gun trunnion roll.

Not shown in the photograph are the gunner's reticle projector that mates with his periscope and provides azimuth deflection of the reticle, the output unit which drives the periscope head mirror, and the commander's sight in elevation and super-elevation.

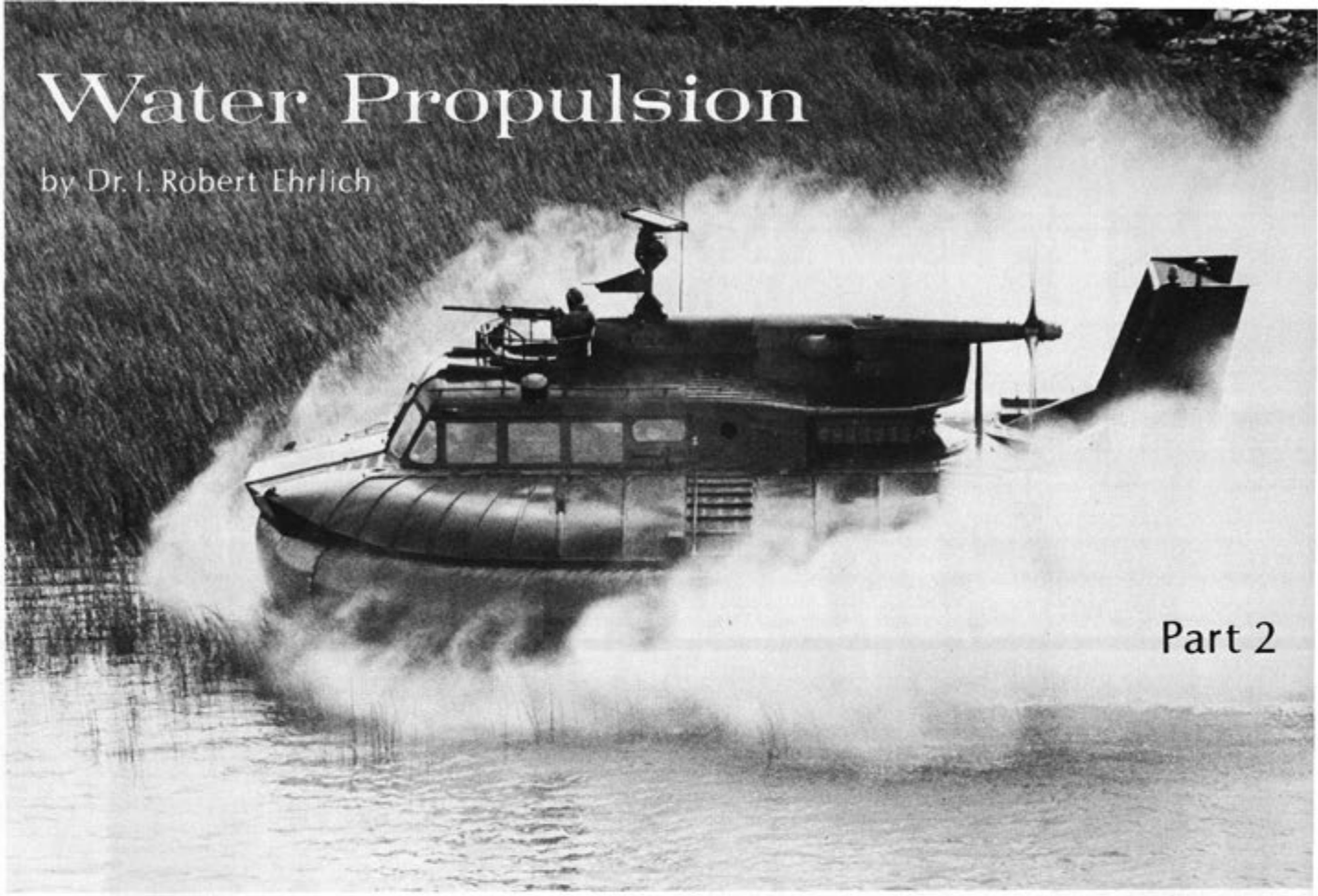
CONCLUSION

Tank fire control systems have evolved to a point where they are one of the most practical methods of increasing the capability of our armored forces. The evolution is not yet complete. Just as new systems increase the effectiveness of our air and naval forces, so will they increase the effectiveness of our ground forces. The next step is already evident. It will be to add an improved day/night poor visibility capability by the application of advanced infrared technology. And there will be steps beyond that.

SAMUEL FEINSTEIN has worked primarily within the field of fire control systems for 26 years, and is currently the manager of gun fire control at Hughes Aircraft.

Water Propulsion

by Dr. I. Robert Ehrlich



Part 2

PADDLE WHEELS

Paddle wheels generate propulsive forces primarily through the drag produced by the paddle elements as they proceed through the water. Propulsion efficiency is high since it is able to move large quantities of water; however, there are several disadvantages which have led to their disuse in ships.

- Variable immersion under different loading conditions inhibits use on cargo vessels.
- The alternating rise of wheels above water level, while the ship is rolling, causes the ship to take an irregular course.
- There is a high risk of damage during rough weather.
- The low speed of the wheels requires large gear reductions from the high-speed machinery usually employed in modern ships.
- The installation of the wheels usually requires an increase in the ship's width, and this increases drag.
- High efficiency requires bulky wheels of large diameter.

In the case of amphibious military vehicles, operations are usually at a single, predetermined loading; and gear-reduction machinery already exists as part of the land-operation drive train. For certain applications, therefore, particularly for shallow-draft boats or amphibians operating in inland waterways, many of the above disadvantages disappear; hence, the paddle wheel may still be practical for these vehicles. The ease of maneuvering which side-wheels provide is a decided advantage for operations in which maneuverability is important. Thus, paddle wheels may have a military use in inland water operations, where they may act as both propulsors on water and wheels on land.

Recent model tests at Stevens Institute indicate that efficiencies of 40 per cent and greater are obtainable with a paddle wheel. While this figure is not as high as that for a propeller, it is significantly better than that achieved by most other propulsion systems.

TRACK PROPULSION

Tracks can be used as paddles for in-water propulsion. However, the complexity of the track system, which is incorporated for good ground performance, imparts many characteristics that degrade water performance. The hydrodynamic performance of vehicles based on this concept is generally poorer than that of vehicles for which other techniques are used. If, on the other hand, tracks are to be used

anyway for land operations, vehicles used primarily on land can profit from the use of properly designed tracks for in-water propulsion.

The development of propulsion forces by such tracked systems depends on the same physical principle as that applied for other in-water thrusters—the rearward acceleration of a mass of water. The efficiency with which this system operates therefore depends on the characteristics of the elements which are attached to the track to achieve this increase in momentum. The *LVTP5* could maintain 6.8mph in water by track propulsion alone. The *LVTP7*, however, can get better speed by directing all of its power through the water jets than by directing it through the tracks.

Critical characteristics which effect track propulsion efficiency are the location, width, height, specing and shape of the grouser. Some attempts have been made recently to capture the flow of water transported forward by the upper track sections, and to redirect it rearward to increase efficiency. So far, the results of these efforts are inconclusive.

AIR-BAG TRACKS

Recently, a unique vehicle termed the Airoll or Marginal Terrain Vehicle has been developed. This vehicle uses large air bags attached to a chain as a form of track. These bags provide a major proportion of the buoyancy required to float the vehicle and, in addition, act as paddle wheels for propulsion.

Full-scale tests are still under study, but they indicate that the vehicle is capable of operating on a wide variety of terrains. Difficulties at this time appear to be associated with obstacle crossing, with control in water, with exiting on slippery banks, and with providing comfortable riding conditions.

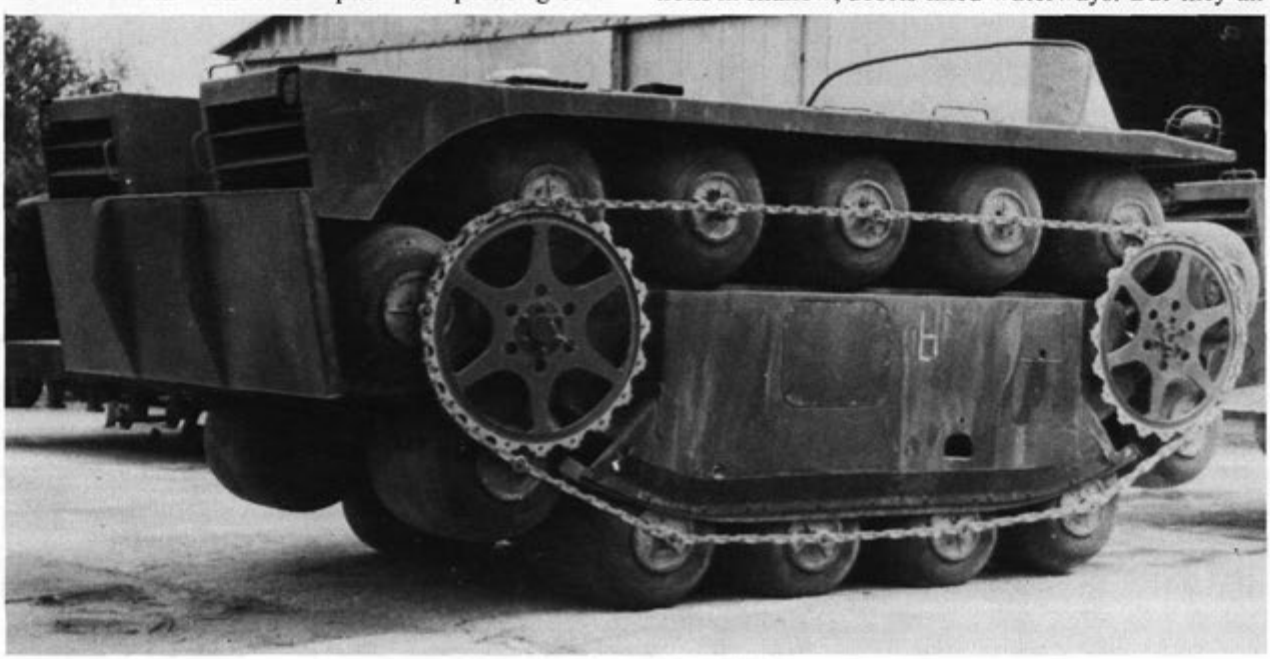
ROWING

A little-considered, but frequently used form of propulsion, is man-powered rowing when all else fails. Tests with eight-oared racing shells indicate that each well-conditioned man of a well-trained crew, delivers .269hp of thrust over a sustained period of 20 minutes. Mark's Engineer's Handbook gives the power of an average man pulling an oar at near .1hp. In terms of thrust, the trained oarsman is providing approximately 31 pounds; the average man, near 11.5 pounds.

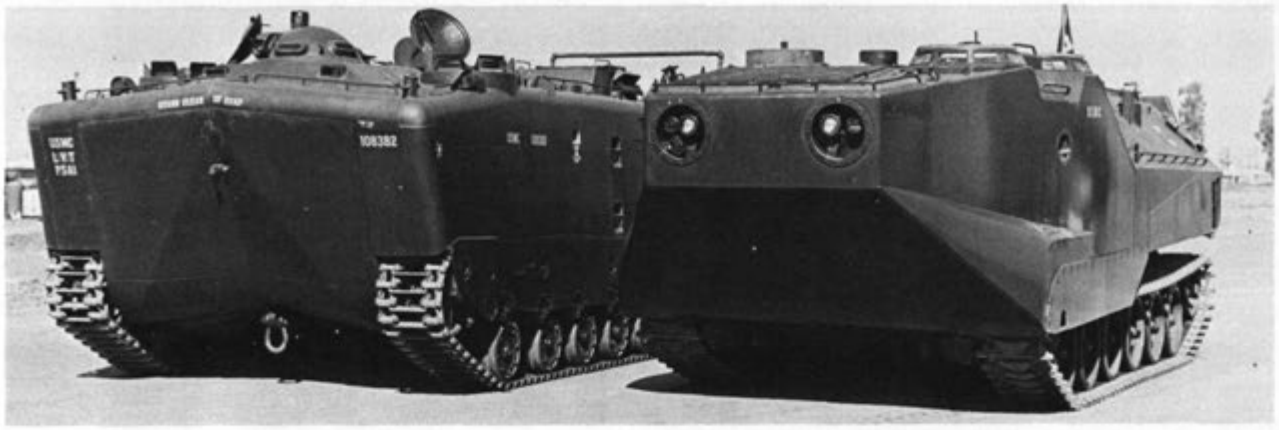
THE FUTURE

So much for past history. Where does the future lie in amphibious vehicles? As discussed previously, wheel and track propulsion is quite inefficient, hence we will continue to see their utilization only on relatively low water speed vehicles (2-3mph for wheels and 4-7mph for tracks). When faster speeds are necessary, we must use a more efficient system. Water jets are currently fashionable because they can be easily incorporated within the vehicle envelope and do not degrade land mobility.

Recent research studies indicate that paddle wheels deserve some further attention, especially for operations in shallow, debris-filled waterways. But they all



The Airoll or Marginal Terrain Vehicle



The *LVTP5*, left, could maintain 6.8mph in water by track propulsion alone. The *LVTP7*, however, can reach higher speeds through the use of water jets.

must eventually yield to the more efficient screw propeller when an acceptable water/land operational arrangement is developed.

Consideration must also be given to amphibious vehicle hydrodynamic resistance. The accompanying chart shows typical speed/drag plots of four amphibians. For comparison between vehicles, we have normalized the data by dividing the measured hydrodynamic resistance by the weight of the vehicle to yield specific resistance, and by dividing the speed of the vehicle by the square root of its length to yield speed/length ratio. This is a standard procedure with naval architects. Note how the slope of the drag curve continues to increase with speed. Since the required power is the product of drag and speed, the power requirements rise even steeper.

At a speed/length ratio of one (for an 11-foot long *M151*, this is 3.8mph), doubling the thrust will increase the speed by only 50 per cent. These curves indicate that increases in speed may also be achieved by a good hydrodynamic shape which reduces the drag and that, if the shape is poor, large increases in thrust will yield but marginal speed increase (the problem of the wheel pump on the *M151* described earlier, is apparent from the difference in drag between the *M151* and the other three amphibians).

Another bit of significant information comes from these curves: hydrodynamic drag is not only a function of speed, it also is a function of vehicle length! Thus, all else being equal, a longer vehicle will also be a faster vehicle. But long vehicles have severe land mobility problems. What of coupling two or more amphibians together end-to-end while they are afloat? Recent model tests indicate that significant decreases in drag, hence increases in speed, may be achieved this way, if properly done.

But the river crossing problem is more than water speed. If a major factor in mobility is speed, then it must be overall speed in many environments. What good is a high speed amphibian if it cannot exit on the other side? Perhaps the most significant increases in river crossing performance will come from improved exiting techniques. These exiting improvements may come from increased thrust in the propulsors (for we know already that good water thrust materially aids exiting). They may also come from improved vehicle traction components. Some feel we must develop improved winching techniques. But the greatest promise, at present, appears to be in a radical change in vehicle configuration.

Perhaps we should develop a river-crossing "pioneer" vehicle. This vehicle, with the most advanced river exiting aids, would proceed the main force, exit, and provide assistance to following elements by towing them up the bank or by excavating the bank to create a less formidable obstacle. Certainly, we must improve our river-crossing potential if we are to improve our overall mobility.

DR. I. ROBERT EHRLICH is manager of the Transportation Research Group at Stevens Institute of Technology, where he is involved with numerous research activities associated with off-road mobility.

Mission and Men

In the past quarter century, a good deal of research has been conducted by behavioral scientists, both within and outside the Army, searching for an optimal approach to the problem of developing leadership. The data, and the resultant theoretical constructs, are now available for us to examine and apply to the leadership challenges we can anticipate in the 1970s. A recent survey by the Combat Developments Command points out that "old styles of leadership, although successful in the past, may not be as effective and may even be counterproductive, in leading troops in the 1970s."

Although there is still a wide diversity of opinion concerning leadership, there are certain common fundamentals that have emerged from a number of separate studies, and we should concentrate our efforts on these agreed-upon principles.

All this, of course, leads to the advent of change. General Bruce Palmer, in addressing a conference on leadership conducted at the United States Military Academy in late 1969, outlined some of the more specific challenges to military leadership, such as ". . . broadening the perspective, intellectual grasp and technical resourcefulness of the leader . . . maintaining

Both are Essential

CAPTAIN MICHAEL D. SHALES

a climate of creativity . . . assisting the leader to see himself as an agent of constructive change." This constructive change need not, indeed should not, involve a total upheaval of our existing institutions; rather, we should identify the problem areas, examine the behavioral research relevant to the particular area, and adapt those applicable principles to our problem solutions.

One of the problem areas that will certainly increase in the years to come will be that of selection for command at the battalion/squadron and company/troop level. It has become increasingly evident that to deal with the soldier of today, and even more so the soldier of tomorrow, the commander must be able to concentrate greater efforts on the individual and his problems. An open and honest atmosphere must be created to promote mutual confidence and trust between the leader and the led. Only then will we return to the cohesive, highly motivated units that have served as our models for almost two centuries.

What do the behavioral scientists have to offer in solving this problem? The majority of leadership theories reduce leadership activities to two dimensions: concern for the mission and concern for the group being led. These dimensions have been described under a variety of labels ranging from "job-centered actions versus employee-centered actions," to "instrumental versus expressive," to "achievement versus group maintenance."

Regardless of the term applied, the basis remains the same. The survival of any organization depends on its ability to solve two problems: the accomplishment of the assigned mission and the satisfaction of the more immediate needs of the members of the organization. Furthermore, if the organization is to function efficiently, two kinds of leadership—mission-oriented and group-oriented—are required and must be mutually supportive.

There is substantial evidence, however, that a single individual can rarely display behaviors along both dimensions in the same organization. It would be convenient if individual leaders were sufficiently talented to handle both dimensions, but unfortunately such leaders are rare.

To overcome this shortage of super-leaders, we should attempt to assign individuals to command and deputy positions, in the same organization, who are complementary to one another in terms of the two

DIMENSIONS OF LEADERSHIP

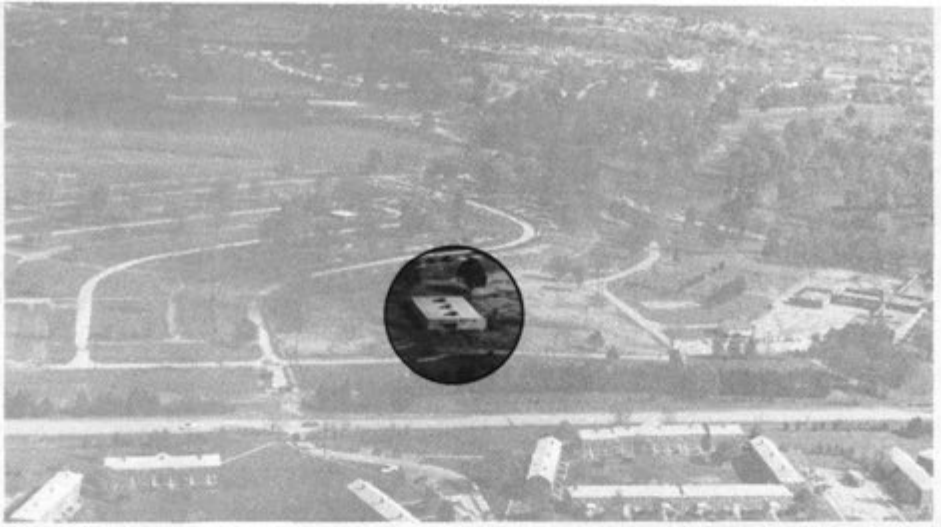
GROUP ORIENTATION	MISSION ORIENTATION
Keeps interpersonal relations functioning and pleasant	Initiates action
Arbitrates disputes	Keeps members' attention on the mission
Provides encouragement	Clarifies the issues
Gives the minority a chance to be heard	Develops procedural plans
Stimulates self-direction	Evaluates quality of work performed
Increases interdependence among members	Makes expert information available

dimensions of leadership. Perhaps the battalion/squadron commander should be mission oriented and the executive officer group oriented. Depending on the specific mission and environment in which the organization is operating these assignments could be reversed.

There may be difficulty in classifying leaders along the two dimensions, but a number of reliable tests have been developed to aid in this categorization. Also, it is possible for the same leader, at different times, to perform either of the roles in separate organizations. A leader who occupied the mission-oriented role as a troop commander could become an outstanding group-oriented squadron executive officer as long as he had a clear understanding of the new role, and his requirement to now be the complement to a mission-oriented squadron commander.

What I have proposed is far from revolutionary; indeed, there are many well-documented examples of this concept throughout our history. What I am advocating is the specific application of these principles throughout the Army. In the years to come we can ill afford to rely on chance in the selection and assignment of our leaders. We must develop a clearly defined approach toward leader selection that will satisfy the organizational requirements for both mission-oriented leaders and group-oriented leaders. Then we will be well prepared to face the leadership challenges of the future.

CAPTAIN MICHAEL D. SHALER has served as a troop commander with the 1st Squadron, 9th Cavalry in Korea; the 2d Squadron, 17th Cavalry in Vietnam; and with the 3d Armored Cavalry Regiment. He holds a master's degree in business administration from the University of Pennsylvania and is presently a student at the Command and General Staff College.



Patton Museum Dedication

In honor of the 87th birthday of General George S. Patton Jr., the new Patton Museum of Cavalry and Armor was formally opened at Fort Knox on 11 November. The opening, which moved the museum from the wooden building it had occupied since 1949, follows a six-year funding effort to provide a fitting facility to house the history and traditions of Cavalry and Armor.

Over 2,000 persons, including relatives of the late General Patton, Governor Wendell Ford of Kentucky, and Major General William R. Desobry, commanding general of the US Army Armor Center and Fort Knox, witnessed the ribbon-cutting ceremonies held at the new site. Following the opening, 1,086 guests attended a formal banquet held in celebration of the occasion. Senator Barry Goldwater, the feature speaker, remarked, "thank God we have a George Patton every once in a while. His was the challenge to understand that just because you have on a uniform, doesn't mean you're outside American life. It doesn't mean that you can ignore politics, history and loyalty. I'd like to see the challenge accepted, to see a new breed of officers in a strong Army of strong-willed individuals who can lead not only on the field of battle, but lead in the formation of ideas, the development of young minds, to the end that we are going to be over-subscribed in the Modern Volunteer Army."

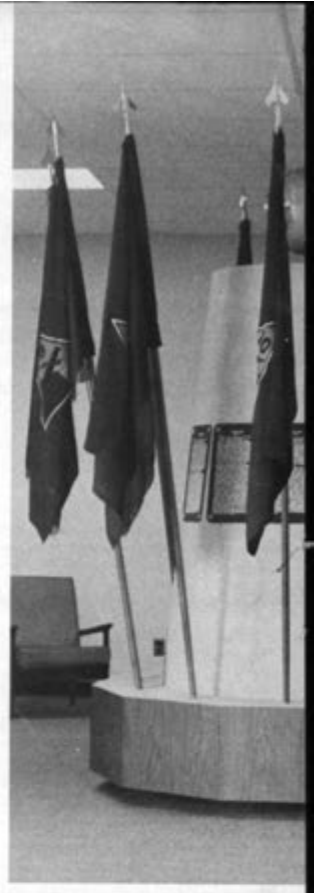
The new museum, which provides 10,000 feet of floor space, is the first of a four-phase building program. Each of the remaining three phases will add an additional 10,000 square feet to the museum. According to Colonel Earl W. Sharp, special assistant to the commanding general for the Modern Volunteer Army, the purpose of the museum "is to provide the public and the military with an educational facility which honors a great man and gives a view of the role of Cavalry and Armor in history." A 3,500-volume library is available to students of military history. The museum also houses an administrative research department, auditorium and main exhibit hall. Tours and films are provided to visitors, along with outdoor vehicle displays and picnic areas.

Originally begun by General Patton following World War II, the collection of memorabilia has grown to include military equipment from the Civil War to the Vietnam Conflict. Over 70 track vehicles are currently on display and the museum contains more than 500 US and foreign weapons. Many of the late General's personal items, such as his staff car, gun collection, diaries and letters, can also be seen. Last year, 300,000 individuals visited the museum while it was housed in the one-time indoor rifle range. However, the new Patton Museum is expected to draw a yearly crowd in excess of 500,000, making it one of the major tourist attractions in the Louisville area.

Total cost of the museum, when all four phases are completed, is expected to be one million dollars. All of the costs for the construction will be provided by individual donations raised by the Cavalry-Armor Foundation—a civilian non-profit organization formed expressly for the purpose of providing a suitable setting to honor General Patton and Armor.

The new Patton Museum provides Armor, and those interested in past military equipment, with the historical resources necessary to make a detailed and scholarly study of past generations of Armor and Cavalry in order to better prepare the generations that will follow. Not only is the materiel that made Armor the Combat Arm of Decision shown, but also, the spirit and the determination that formed the Armor of today.

Senator Barry Goldwater was the featured speaker at the Patton Museum Memorial Dinner.

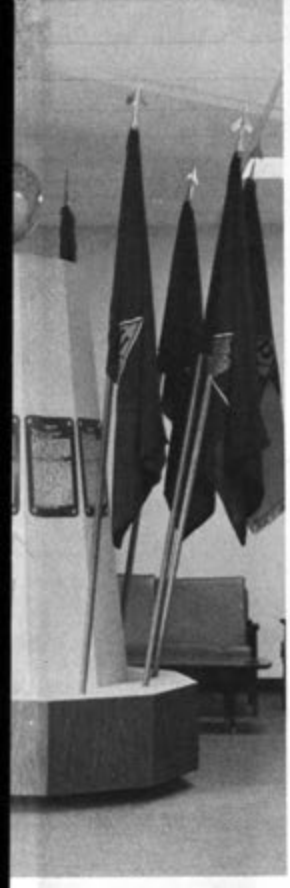


Display of inactivated World War II armored division flags in the Patton Museum lounge area.

American World War II tanks on the museum grounds.

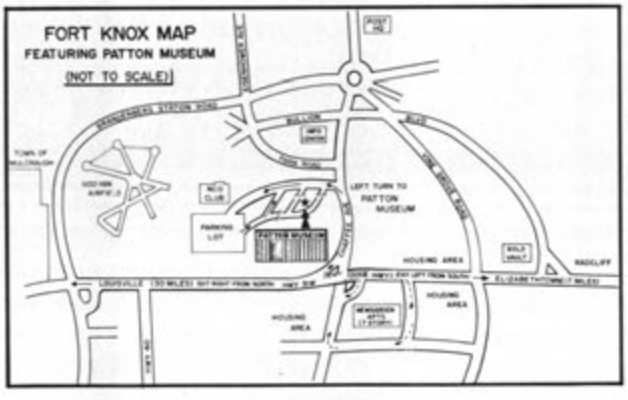
Brigadier General George S. Patton, son of the famous general, addresses guests at the Patton Museum Memorial Dinner.

The French Cadillac staff car in which General Patton was fatally injured in an accident is one of the many items displayed at the new museum.



Plaster bust of General George S. Patton Jr. made by Private First Class Leonard Shartle of Fort Knox.

Captured World War II field armament at the museum site.



Mr. Jim Cooke, president of the Cavalry-Armor Foundation, has just presented the deed to the museum building to Major General William R. Desobry.

Future Tank Design

by Richard M. Ogorkiewicz

The time is rapidly approaching when the production of the current generation of battle tanks will come to an end. Therefore, it is becoming increasingly urgent to consider what might be developed to follow them.

Some have already suggested that, whatever is developed, it should not be another generation of battle tanks because, in their opinion, the usefulness of the tank is coming to an end. Forecasts of this kind are not new. They have been heard on many previous occasions, but so far they have all proven wrong. It is very tempting to assume that the latest forecasts are equally erroneous and to dismiss them without further consideration.

However, it is interesting to consider why the death of the tank has been forecast so often and why, in spite of it, the tank remains an important item of military equipment. When this is done, it is evident that such forecasts have generally coincided with the appearance of new antitank weapons. Each has made it clear that tank armor can be penetrated, thereby shattering the popular belief that the tank is immune to enemy fire. Thus, the appearance of new antitank weapons has repeatedly led to gloomy forecasts.

Each time, however, the prophets of doom overlooked the fact that tanks have never been invulnerable, and that their value does not depend solely or even principally on armor protection.

The principal merit of the tank is that it can make its heavy direct-fire weapons far more mobile and therefore more effective than they would otherwise be. The ability to do this is only partly due to the armor protection. This accounts for the continued survival of the tank, despite the fact that its armor can be penetrated by a number of weapons.

BATTLEFIELD MOBILITY

The battlefield mobility which the tank provides to its mounted weapons stems from two entirely different sources. The more obvious of the two is the ability of the tank as a tracked automotive vehicle to move over various types of terrain and obstacles. The second source of battlefield mobility is the armor protection which enables the tank to ignore the threat of fire from a significant number of weapons. In consequence, it can move on the battlefield more freely than other unprotected or only lightly armored weapon systems.

The contribution of armor protection to the battlefield mobility of the tank has, unfortunately, tended to be obscured by the adverse effects of the weight of armor plating on automotive performance and transportability. This has been particularly evident whenever armor plating of tanks was carried to the extreme in the forelorn hope that this would make them invulnerable. In consequence, several attempts have been made to keep the armor plating to a minimum, in order to make the tank lighter and, hopefully, more mobile. However, short of the extremes, weight has proved to have a limited effect on mobility. As a result, a reasonably high degree of

armor protection offers a greater overall improvement in battlefield effectiveness than attempts to reduce weight below that allowed by characteristics of the ground over which the tank is expected to operate.

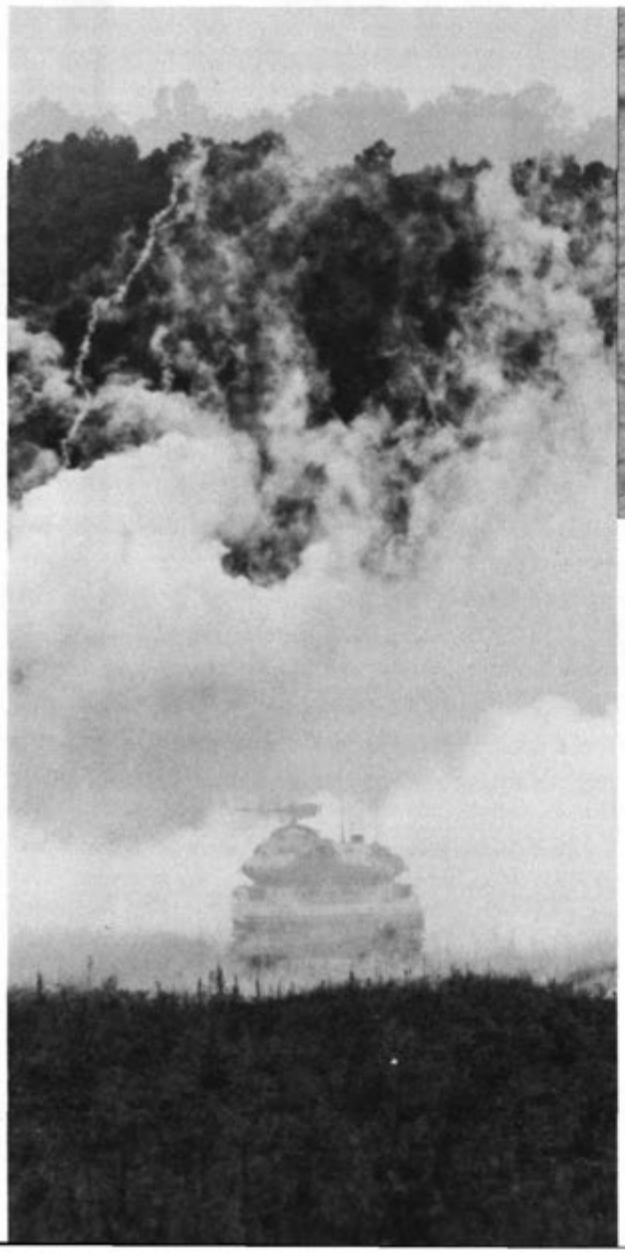
In fact, track ground pressure and other factors which need to be taken into account if the tank is to operate without undue difficulty in many parts of the world limit the weight to about 45 tons. Within this weight limit, the tank can only be made immune to a certain number of the weapons deployed by enemy forces. Armor plating does, nevertheless, make it considerably less vulnerable, overall, than other weapon systems, such as missile launchers mounted on jeeps or exposed on top of armored personnel carriers.

HELICOPTER ALTERNATIVE

As a mobile weapons platform the tank is likely to be needed as long as ground forces require mobile heavy weapons. Thus, the only thing that could eliminate the need for the tank is the development of a superior weapons platform.

According to some, an alternative exists in the attack helicopter. The helicopter is undoubtedly greatly superior to the tank, and indeed all other ground vehicles, in mobility, which is unaffected by most terrain features. On the average, it is capable of reaching engagement positions in a fraction of the time required by ground vehicles. The helicopter is vulnerable, however, to a greater number of weapons than the tank and still must show that it can operate effectively in the face of a sophisticated enemy.

Several trials have been carried out already with missile-carrying helicopters operating against tanks. Some have produced very high estimates of the tank-helicopter exchange ratio, that is, of the number of tank kills per helicopter kill. However, these estimates need to be qualified. Countermeasures against the helicopter are only beginning to be developed.



The cost of one attack helicopter is equivalent to the cost of several tanks, which means that the exchange ratio needs to be high if the employment of attack helicopters against tanks is to be cost-effective.

The helicopter is less versatile than the tank as a weapons platform. In particular, it cannot carry high velocity guns, which are indispensable in the killing of enemy tanks. Moreover, the helicopter is incapable of remaining in a given area as long as a tank, which means that its surveillance capability is restricted in time and can prevent it from engaging targets when required.

Thus, the helicopter has shortcomings as well as advantages, just as the tank does. Some of its most ardent advocates are prepared to admit that the

British Chieftain

helicopter can only be a supplement to the tank, and not merely a substitute.

GUNS OR MISSILES?

If the tank or a tank-like vehicle will continue to be needed, what form is it likely to take?

To a large extent, the answer depends on the weapons which the tank will be expected to make more mobile; for it will be designed around these weapons. The weapons mounted in the tank need to be effective against enemy tanks and other armored vehicles, which have replaced men as the primary targets on major battlefields.

So far, guns have met this need; growing steadily in size and power over the years. The latest range in caliber from 105 to 120mm, and typically fire armor-piercing projectiles with high density penetrators. The muzzle velocities are between 4,500 and 5,000 feet per second. As a result, they are capable of killing all enemy tanks within the most probable range of engagements. However, current tank guns also exhibit a number of shortcomings. In particular their hit probability leaves something to be desired at longer ranges. They are also relatively heavy and their recoil loads have made it necessary to mount them in a fairly heavy vehicle.

The disadvantages of guns and the progress made with guided missiles directed considerable attention during the past decade toward missiles as an alternative form of tank armament. This led to the development of the *Shillelagh* Guided Missile System for tanks, which started in the late 50s, and numerous proposals for missile-armed tanks.

The principal attraction of guided missiles as battle tank armament has been that their hit probability is higher than that of guns at longer ranges. However, the ranges at which missiles become superior to guns have tended to be outside the most likely range of engagement, dictated largely by the terrain. This has been particularly true since the development of advanced tank fire control systems based on laser rangefinders, which have significantly increased the range at which the relative effectiveness of the two weapon systems changes. In consequence, missiles are likely to be superior to guns less frequently than guns to missiles.

Moreover, missiles are considerably more expensive than tank gun ammunition. The cost of one missile of the *Shillelagh*-type is equivalent to at least 20 tank gun rounds. As a result, guided missiles are far less attractive on cost-effectiveness grounds than they appear at first sight. In fact, the high cost of missiles, coupled with the development of automatic loading mechanisms for tank guns, makes it possible to consider firing a rapid sequence of two or three rounds of gun ammunition as the equivalent of a missile launch without prejudicing the cost-effectiveness of gun armament.

Tank guns also offer the advantage of being able to fire high-velocity armor-piercing shot as well as projectiles with shaped-charge warheads. In consequence, they force the enemy to protect his tanks

Swedish S-Tank

French AMX30

against two different threats. He would not have to do this if the tanks opposing him were armed with guided missiles. Moreover, it is possible that further development of more sophisticated, composite forms of armor plating will make it easier to develop a higher degree of protection against shaped-charge warheads than against the very high-velocity, high-density penetrators of tank gun projectiles.

Against this, guided missiles offer the possibility of developing vehicles which are very light yet powerfully armed. However, lightweight vehicles are inevitably lightly armored and, in view of all that has been said so far, very light weight is not worth the expense of increased vulnerability unless special circumstances such as air transportability override all other considerations.

FURTHER WEAPON DEVELOPMENTS

In the various discussions of alternative forms of tank armament it is sometimes overlooked that guns are capable of further development. Their performance could be significantly improved by increases in muzzle velocity, by development of fin- instead of spin-stabilized hard core projectiles and by the use of liquid propellants. There are also possibilities for the improvement of tank gun fire control systems. One is a system which would track the first round and, if a hit was not made, would automatically correct the aim so that the second round would have a very high hit probability. Analogous systems have already been developed for anti-aircraft guns.

There appears to be little choice between guns with advanced fire control systems and guided missiles when it comes to the engagement of moving, rather than stationary, targets. On the other hand, guided missiles are undoubtedly superior to guns at very long ranges. The opportunity to engage targets at such ranges may not occur frequently, but when it does, the advantages of missiles should be exploited. At the present stage of technological development, this would best be done by developing missiles with semi-active terminal guidance and laser target illuminators. A similar guidance system has been proven in the laser-guided bombs so successful for the US Air Force in Vietnam. What remains to be seen is the form in which laser-based semi-active guidance will be used on the ground to engage enemy tanks at long range.

One attractive possibility is a missile which could be fired from the tank's main gun as a form of complementary, long-range ammunition, without compromising the characteristics of the gun the way *Shillelagh* did the *XM803*.

Alternatively, terminal homing could be applied to rocket-assisted HEAT projectiles of tank guns or of 155mm self-propelled howitzers. If either approach presented great difficulties, missiles with terminal semi-active guidance could be mounted in pods on a number of the basic tank guns.

The least attractive solution, both on grounds of

West German Leopards

tactical flexibility and cost-effectiveness, would be to develop special armored vehicles to act only as missile launchers.

Whatever the form in which the semi-active guidance system involving homing on to a target illuminated by a laser is applied, it will not solve the outstanding problem of engaging armored vehicles which are behind cover. This problem is becoming more important in view of developments such as the German *Jagdpanser rakete* which can fire from behind cover, exposing no more than one of its retractable missile launch tubes and the periscope head. Much the same effect could be achieved by a tank with low frontal profile gun mountings. Thus, given suitable terrain, either type of vehicle would present a very unprofitable target for direct fire.

Something could be done against such targets by indirect fire, using 155mm shells developed along the lines of the *Flying Gun* projectiles designed some years ago in Sweden by General H. Jentzen. The shell discharges a shot-gun pattern of subcaliber projectiles at a predetermined height. A more sophisticated approach might employ a shell or missile with passive homing on the thermal or electromagnetic signature of tanks.

SYSTEM IMPROVEMENTS

The converse of the indirect fire problem is that tank design could take greater advantage of the opportunities offered by terrain, particularly in relation to defensive employment. But no matter how favorable the terrain and how good they are at exploiting it, tanks will still need to break cover at one time or another. When they do, their chances of survival depend to a large extent on their silhouette and their agility: the first governs the probability of being hit once the tank has been acquired by an enemy weapons system; and the second determines how long it is likely to expose itself while moving from one position to another.

The lowest possible silhouette is offered by the turretless, fixed-gun-type tank, of which the Swedish *S-Tank* is a good example. The obvious way of improving the agility of tanks is to fit them with more powerful engines, thereby increasing the power-to-weight ratio. Existing tanks, such as the French *AMX30* and the German *Leopard*, already have 20 horsepower per ton, and the *XM803* originally was to have about 30.

A less obvious, but no less important way of making the tank more agile is to improve it as a man-machine system, thereby shortening the crew's reaction time. A major step in this direction has been the design of the *S-Tank*, which dispenses with the traditional time-consuming procedures involving sequential action on the part of several crew members. Thus, the *S-Tank*, which has integrated driving and gun controls, can react more quickly than conventional tanks. This, as well as all its other advantages, outweighs its inability to fire its main armament on the move in any direction but straight ahead. However, even the accuracy of turreted tanks firing on the move is questionable.

Perhaps the most immediate contribution to reducing the reaction time could be to fit the tank with stabilized sights for the commander. This would greatly improve the commander's ability to observe on the move and to acquire targets quickly. The *S-Tank* has such a sight, and its provision on other tanks is overdue.

The next and even greater improvement in observation and target acquisition capability should result from the development of night-viewing equipment. This includes image intensifiers based on low

The *M60* series has gone through several product improvement programs in attempts to keep up with advancing technology.

The *M60A2* links the proven automotive performance of the *M60A1* chassis with a new, fully stabilized, compact turret.

light level television, of which the *Starlight Scope* is an example, and thermal imaging passive infrared devices, exemplified by the forward looking infrared (FLIR), which has been used on gunships in Vietnam. FLIR appears particularly attractive for tanks, as it could be used not only for night viewing but also for several other purposes. A tank version has been developed by the Hughes Aircraft Company.

AUTOMOTIVE COMPONENTS

In addition to enabling the tank to move more quickly over short distances, higher power-to-weight ratios should also, in theory, increase the sustained maximum speed. In practice, however, maximum speed is likely to increase only with engine power on relatively hard, smooth surfaces. Cross country, the maximum sustained speed is generally limited not by engine power but by ride characteristics; in other words, by the amount of pitching and bouncing that crews can withstand.

Recent developments in hydro-pneumatic suspension claim to greatly improve ride characteristics. However, there has been no evidence of any real significant breakthrough in sustained cross-country speed.

To be significantly faster, a tank would have to be longer than it is or be fitted with powered suspensions with automatic ride control. Unfortunately, the first solution implies articulated, two-part vehicles which are heavier, more vulnerable and less maneuverable than conventional tanks. The second solution creates greater complexity and cost. In short, neither is acceptable.

Moreover, any practicable increase in sustained cross-country speed is of doubtful importance, particularly from the viewpoint of improving chances of survival. The response of the opposing weapon systems is likely to be much more rapid than the speed of the tank as a target.

As far as the engine is concerned, there is no overwhelming argument for departing from the diesel which powers all but one of the current generation of battle tanks. The one exception is the *S-Tank*, which has a gas turbine as well as a diesel. However, in spite of its use in the *S-Tank*, and repeated acclaim, the gas turbine still must prove its ability to match the fuel economy of the diesel under the special operating conditions unique to tanks and its ability to operate in dusty environments. At the same time, the gas turbine remains considerably more expensive to manufacture than the diesel.

It is possible, however, that the conventional, piston-type diesel will be partly replaced by the rotary, Wankel-type diesel. The latter offers the advantage of smaller specific volume without the high-cost disadvantage of the gas turbine. Considerable progress in its development has been made in England by the Rolls-Royce Motors Company. But it will be at least another year before the Rolls-Royce rotary diesel is installed in an armored vehicle and its performance characteristics fully assessed.

EMPLOYMENT OF TANKS

In any event, even before any novel engine becomes available, there are ample opportunities for the development of a new and greatly improved generation of battle tanks. Much of their potential would be lost, however, if the new tanks were not fully and effectively employed.

To insure that they are, tanks will have to be employed in a different way than some of the existing concepts would suggest. These include the concept of

the limited-purpose "assault tank," which should have been discarded a long time ago, but which persists in some of the most advanced industrial organizations connected with tank development. They also include the concept that the true role of the tank is to be reserved for "mobile exploitation." This amounts to wishful thinking that someone else will somehow accomplish the difficult task of defeating the enemy.

All such notions that the tank is something special should have been swept away long ago by the recognition that, far from being a special-purpose vehicle, the tank is a general means of making direct fire weapons more mobile and therefore, more effective. As such, the tank should not even be defined as only an "offensive weapon system," as it still is in doctrinal documents. In fact, it is no more "offensive" or "defensive" than an infantryman is "offensive" or "defensive." Moreover, it has amply demonstrated its effectiveness in defensive operations, including static defense.

As a general method of making weapons more effective, the tank should be employed to the greatest possible extent, but in a manner adapted to the modern battlefield environment. In face of increasingly more powerful antitank weapons, its employment should be based more than ever on a combination of its own and other weapons' fire with movement and the maximum use of ground cover.

The best tactics will not, of course, prevent some tanks from being destroyed. But, given sound development, the tank should be able to meet the continuing need for a mobile ground weapons platform.

RICHARD M. OGORKIEWICZ, senior lecturer in mechanical engineering at the Imperial College of Science and Technology in London, is widely recognized as a leading authority on armored fighting vehicles. A frequent contributor to *ARMOR*, he is the author of *Armoured Forces* and *Design and Development of Fighting Vehicles*.

GO NO-GO

A Comparison of Heavy Machine Guns

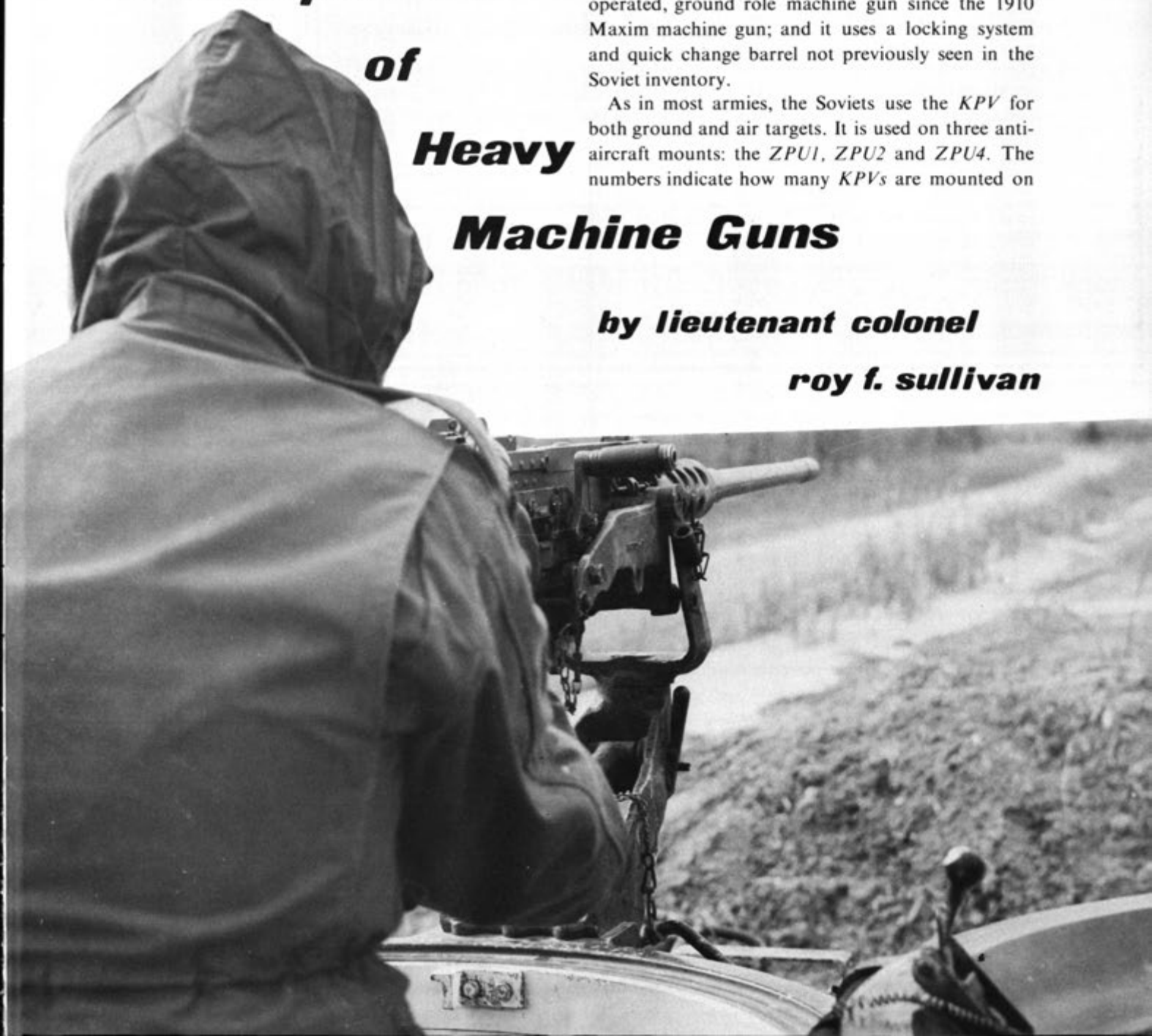
by lieutenant colonel roy f. sullivan

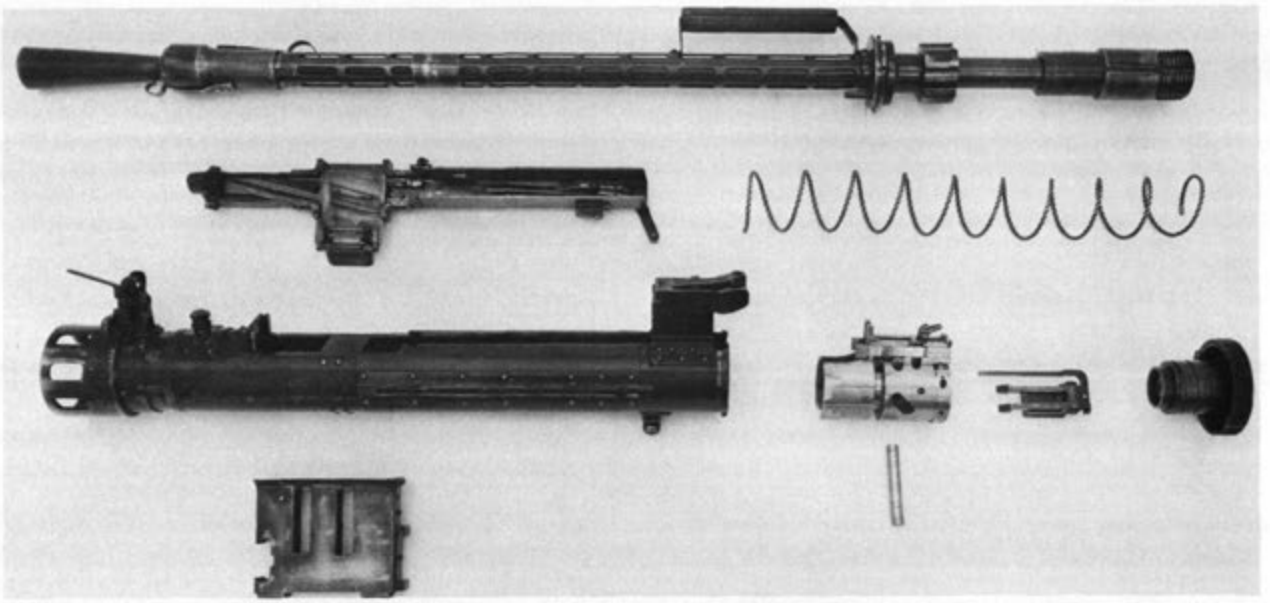
In these days of burgeoning developmental demands and staggering R&D costs for fighting vehicles, it is refreshing to consider one of the simpler weapons in our inventory—the heavy machine gun.

US Armor has relied on the Browning .50 caliber machine gun since World War II. More recently, the *M60* fleet of main battle tanks has been equipped with the *M85* tank machine gun. In contrast, the Soviet armed forces have been phasing in a powerful heavy machine gun, the 14.5mm *Vladimirov* or *KPV*, since the end of World War II.

The *KPV* is distinctive among Russian machine guns in at least two respects: it is their first recoil operated, ground role machine gun since the 1910 Maxim machine gun; and it uses a locking system and quick change barrel not previously seen in the Soviet inventory.

As in most armies, the Soviets use the *KPV* for both ground and air targets. It is used on three anti-aircraft mounts: the *ZPU1*, *ZPU2* and *ZPU4*. The numbers indicate how many *KPVs* are mounted on





The *KPV* can be field stripped without special tools

each model. Twin *KPVs* are also mounted as an antiaircraft weapon on at least three types of armored personnel carriers: the *BTR50P*; and the older *BTR40* and *BTR152*.

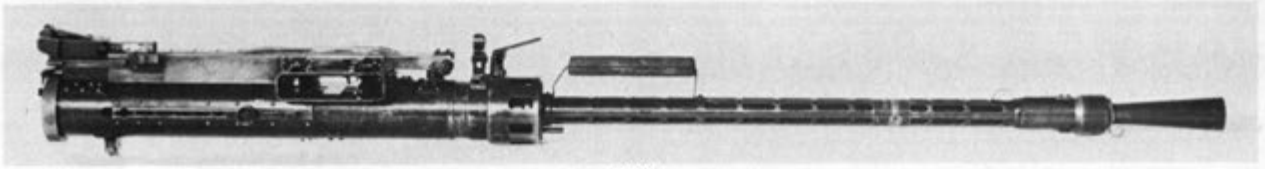
On the Soviet *T10M* heavy tank, the *KPV* fulfills both the ground and antiaircraft roles. It is mounted on the cupola and is also mounted coaxially for ground targets. It is also found on the *BTR60PB* armored personnel carrier and on the amphibious scout car, the *BRDM2*, for ground engagements.

Like both of the American .50 caliber machine guns, the *KPV* is recoil operated, air cooled and uses a disintegrating metallic link belt which can be broken into convenient 10-round lengths by the feed system. A muzzle booster assists the short recoil action and a chrome barrel elongates its life. This barrel is removed from the machine gun complete with its barrel jacket.

Unlike our .50 caliber machine guns, the *KPV* has a cylindrical body and bolt. A rotary action twists the bolt assembly's locking threads into the barrel. Like most Soviet machine guns, it is relatively simple, easy to manufacture (partially because of the cylindrical design), and easy to maintain. The *KPV* has many stamped parts, can be field stripped without special tools and its action is well-sealed against dirt and moisture. It requires no headspace adjustment as does the Browning .50 caliber machine gun with its go-no go gauge.

The Browning .50 caliber *M2* heavy barrel machine gun, used on US armored personnel carriers, is an old and reliable performer. However, maintenance, especially the headspace and lubrication, must be scrupulously performed.

A considerable improvement over the Browning *M2* is the *M85* tank machine gun developed by Aircraft Armaments Corporation as a shorter, lighter tank weapon for either cupola or coaxial mounting.



KPV

Unlike the *KPV* and the Browning *M2*, it has two cyclic rates of fire: a slow rate for ground targets; and a fast rate for air targets. This is an advantage over the *KPV* and *M2* single rates of fire against targets as diverse as a squad of riflemen or a high performance aircraft.

Perhaps the most important difference between such weapons is their effect against armor. Comparisons are inexact and difficult to make because of a lack of commonality, but the *KPV* has the best armor penetration of these three heavy machine guns. At zero degrees obliquity, the *KPV* can penetrate 1.26 inches of armor at 500 meters, making it lethal against all armored personnel carriers, scout cars and even many light tanks. In comparison, the American machine guns can penetrate .88 of an inch of homogeneous armor at zero obliquity at 91 meters.

Despite its relative age and simplicity, the *KPV* is a rugged and hard-hitting sidearm for Soviet fighting vehicles. It outclasses our Browning *M2* heavy barrel model, and closely contests our newest tank machine gun, the *M85*.

COMPARISON OF HEAVY MACHINE GUNS

Characteristics	USSR	USA	
	KPV	M2	M85
Caliber	.57	.50	.50
Cyclic rates of fire	600rpm	450-500rpm	1,000-1,100rpm 350-450rpm
Muzzle velocity	3,281fps (AP)	2,930fps (M2) 3,050fps (API, M8)	same as M2 same as M2
Armor penetration	1.26in @ 500m	.875in @ 91m	same as M2
Maximum ranges:			
horizontal	2,000m (AP)	1,829m	1,829m
slant	1,400m (AP)	5,916m (API, M8) 6,812m (M2)	5,829m (API, M8) 6,652m (M2)
Weight of bullet	923 grains	709 grains	709 grains
Operation	recoil	recoil	recoil
Overall length	79in	65.1in	54.5in
Barrel length	53.5in	45in	36in
Gun weight	108lbs	84lbs	61.5lbs
Feed	metallic link	metallic link	metallic link
Sights:			
front	post	hooded blade	NA
rear	tangent leaf	leaf	NA

LIEUTENANT COLONEL ROY F. SULLIVAN, a graduate of Texas A&M and of the University of Arizona, has authored four previous articles for *ARMOR*. He commanded the 90th Replacement Battalion in Vietnam, and is currently assigned to the Military Equipment Delivery Team in Cambodia.

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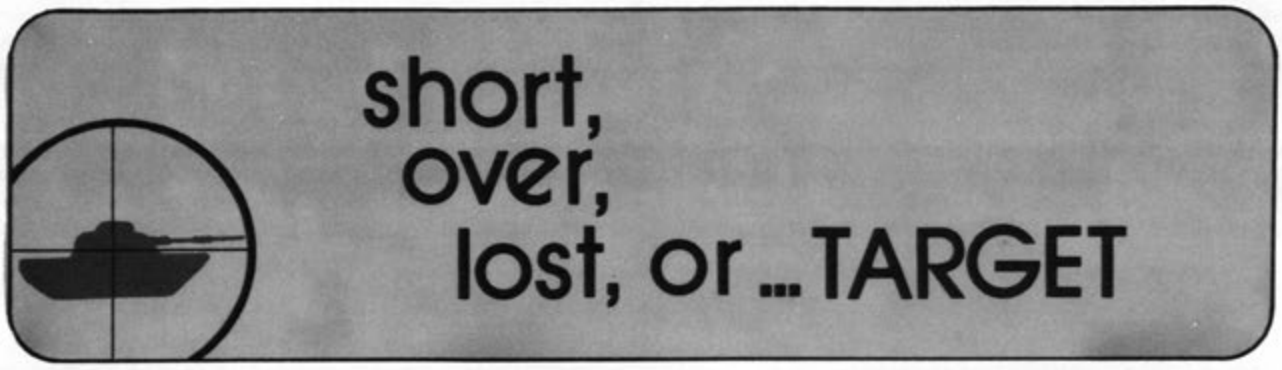
US Armor Association Saber Awards

The United States Armor Association annually awards a presentation saber to each of the top two Distinguished Military Graduates of the Army Reserve Officers' Training Corps who receive Regular Army commissions in Armor. Recipients are chosen by Department of the Army for their outstanding achievements in academic study, physical education and military leadership. The 1972 recipients were Second Lieutenant James M. Hackedorn, who received the award from Major General Frederick J. Kroesen, commanding general of the 82d Airborne Division; and Second Lieutenant Kevin H. Rorke, who received his saber from Major General James F. Hamlet, commanding general of the 4th Infantry Division.

Second Lieutenant James Hackedorn, a graduate of Texas A&M, is currently a platoon leader with the 68th Armor, 82d Airborne Division at Fort Bragg.

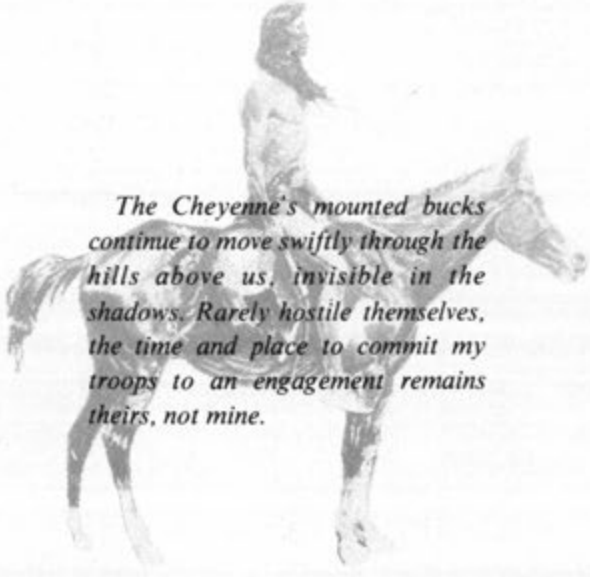
Second Lieutenant Kevin Rorke received his commission in Armor through the ROTC program at Washington University. He is presently assigned to the 34th Armor, 4th Infantry Division at Fort Carson.



This department is a range for firing novel ideas which the readers of ARMOR *can sense and adjust. It seeks new and untried thoughts from which the doctrine of tomorrow may evolve. Items herein will normally be longer than letters but shorter and less well developed than articles—about 750 words maximum is a good guide. All contributions must be signed but noms de guerre will be used at the request of the author.* ON THE WAY!!

The Scout's Mount——10 to 1

By Lieutenant Colonel Burton S. Boudinot



The Cheyenne's mounted bucks continue to move swiftly through the hills above us, invisible in the shadows. Rarely hostile themselves, the time and place to commit my troops to an engagement remains theirs, not mine.

This short excerpt from a captain's report of 23 June 1876 defends the "skinny Indian" concept for the armored cavalry scout. Take for example, the simple division of $15,000 into $150,000 which gives a quotient of 10. Assume that $150,000 is the predicted low end cost of one Armored Reconnaissance Scout Vehicle (ARSV), and that $15,000 is the high end cost of one Light Armored Reconnaissance Vehicle (LARV). The difference in item cost is so dramatic that a very careful analysis should be made by Armor as to the merits of each. It is recognized that in 1938 a scout car was an unpopular expense over the cavalry mount.

It is not as if the ARSV is becoming a reality tomorrow because it was the only way to go. No, it is because in 1965 that was the direction Armor wanted to go and so created a sacred requirement in the form of a qualitative materiel requirement (QMR). We thought we needed a highly mobile armored vehicle to carry a scout squad into a high intensity combat environment.

In 1973, as we are approaching the results of such a requirement, we are also realizing true end item cost. When we, in armored cavalry, stated the requirement that we wanted a three-man vehicle that could see and hear in the dark, *fly*, float, and destroy all types of vehicles in combat except the tank, we knew we were going to pay dearly for it. The role of the scout versus his vehicle need has been a continuous source of controversy ever since.

It seems reasonable to expect that the basic scout vehicle should not be an expensive item to either procure or operate. When cavalry units transitioned from jeeps to the *M114*, the original cost of this track vehicle was $25,000. From hoofs to wheels in the 1930s, now it was wheels to tracks. The cost was a shock; however, the rationale was that the scout would obtain the armor protection we had sought for so long. It would be interesting to find if anyone has statistically measured the degradation of agility, re-

XR311

sponsiveness, stealth, maintenance ratio, operational cost and crew fatigue as a result of taking the armored cavalry scout off wheels and putting him on tracks.

It has often been said that the *M114* was only a "foot in the door" or interim to what we really wanted for a scout vehicle. Well, this "foot in the door" has been with us for a decade. The fleet, as machines, has been less than perfect; but more important, the tactical utilization of the *M114* has definitely jeopardized the role of the scout and degraded reconnaissance capability for almost ten years. To improve the *M114* is a materiel objective only and not an improvement for the scout role.

There is a question in the Armor Community of the merit of protecting, upgunning and equipping the scout to a point where his vehicle becomes primary. Without a vehicle, his mission to report does not change. With radios out and vehicle burning, a $3.00 flare may end up his claim to fame. With the ARSV concept as it is today, one can visualize how the advance of a main force unit might be held up, waiting for the outcome of a decisive cavalry battle taking place in the valley ahead. If we arm the scout as a fighter, he is likely to become one.

There is a place for heavy cavalry elements and a number of ARSVs for that matter. However, the characteristic mission of armored ground reconnaissance units and the duties of the MOS 11D must not be compromised by encouraging decisive engagements with the enemy reconnaissance or advance guard elements.

M114

Therefore, for the normal missions of reconnaissance, security, patrolling, escort and even training, we should look carefully at the Light Armor Reconnaissance Vehicle for cost and combat-effectiveness.

It is not as if a LARV does not exist today; it does. Let's not exclude a derivative of the motorcycle for armored cavalry, but only in a secondary role. We should continue to develop and test its potential in that role. Industry, however, has provided working configurations of a scout car that has demonstrated potential much greater than the jeep and is considerably less expensive than even the *M114*. The Army is testing the *XR311*, an armored dune buggy, and many skeptics and doubters are now supporters. In two years, Armor can put selected scout elements on a highly mobile 5,000-pound chassis with machine gun, grenade launcher, radios and armor protection for a price the Army can well afford. The interesting aspect of the LARV concept is that its size and performance is highly complimentary to the role and missions of a scout squad. True, its survivability in high intensity combat is questionable and commits the scout to a traditional role of "sneak and peek" unless, of course, cornered.

There is a place, however, for a Light Armored Reconnaissance Vehicle in armored cavalry units. It is not interim to anything; we, in Armor, must take the initiative and continue to develop its potential for what is obviously a very attractive life cycle cost for the scout squad to accomplish its true mission. You can bet on that 10 to 1!

LIEUTENANT COLONEL BURTON S. BOUDINOT, commissioned in 1953, has served with Armored Cavalry units in Korea, Germany and Vietnam, and commanded the 6th Reconnaissance Squadron at Fort Knox. In 1971, he was assigned to the US Army Armor and Engineer Board as chief of Methodology and Operations Division. Currently, he is chief of Armor Test Branch, and has recently served as an AMC representative with the *Main Battle Tank Task Force*.

How Would You Do It?

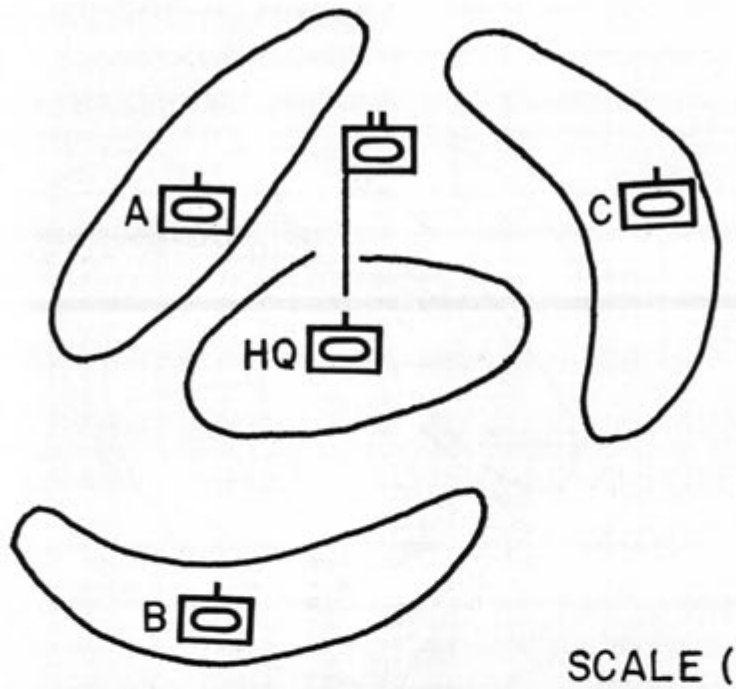
US ARMY ARMOR SCHOOL PRESENTATION

SITUATION:

You are the S3 of a tank battalion and have been informed by the battalion S2 that the enemy has moved a weapon systems within a range capable of delivering a 2-, 5-, or 10-KT nuclear weapon on your position, and than an attack is imminent. The commander will accept no more than one-third of the battalion vulnerable to loss from an enemy nuclear attack. The disposition of your unit is shown in this diagram.

AUTHOR: CPT GEORGE H. HANDLEY

ILLUSTRATOR: ROBERT WILDER



SCALE (1:50,000)

PROBLEM:

Using the command guidance given you, and your knowledge of vulnerability procedures, how would you determine the vulnerability for the personnel and equipment in your unit?

SOLUTION:

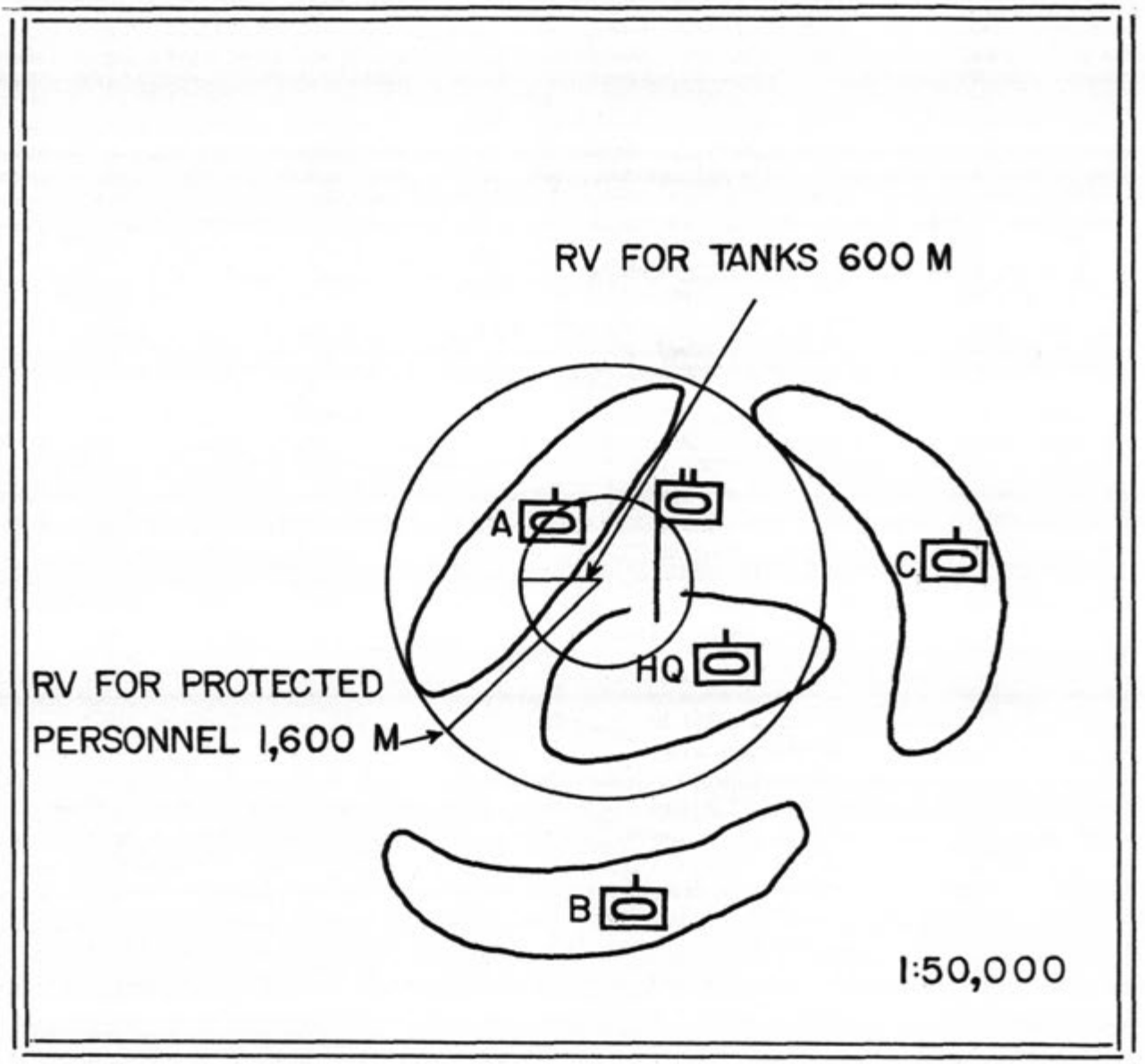
FM 101-31-1, annex B-VII, contains information on how to determine the radius of vulnerability of friendly units.

Step No. 1. Determine the largest yield the enemy is capable of delivering. Based on current intelligence, or the enemy's past use of nuclear weapons, the intelligence officer assumes a weapon yield that the enemy is likely to use against friendly positions or installations. (The S2 has stated the enemy is capable of delivering a 2-, 5-, or 10-KT weapon.)

Step No. 2. Determine the degree of exposure of the friendly units. The condition of exposure for friendly units is provided by the S3 (S4 for trains). Since the S2 has stated that an attack is imminent, you have determined that units will be protected. (Troops will be in buttoned-up armored vehicles or foxholes with overhead cover.)

Step No. 3. The appropriate radii of vulnerability (RV) are obtained from the radii of vulnerability tables. (For training, the table is located in FM 101-31-1 or FM 101-31-3; for actual RV, the table is located in FM 101-31-2 (SRD).)

Step No. 4. The radius of vulnerability is placed over the center of greatest concentration. The ground zero for this type of analysis is the point that would result in the greatest loss to friendly forces. (See diagram.)



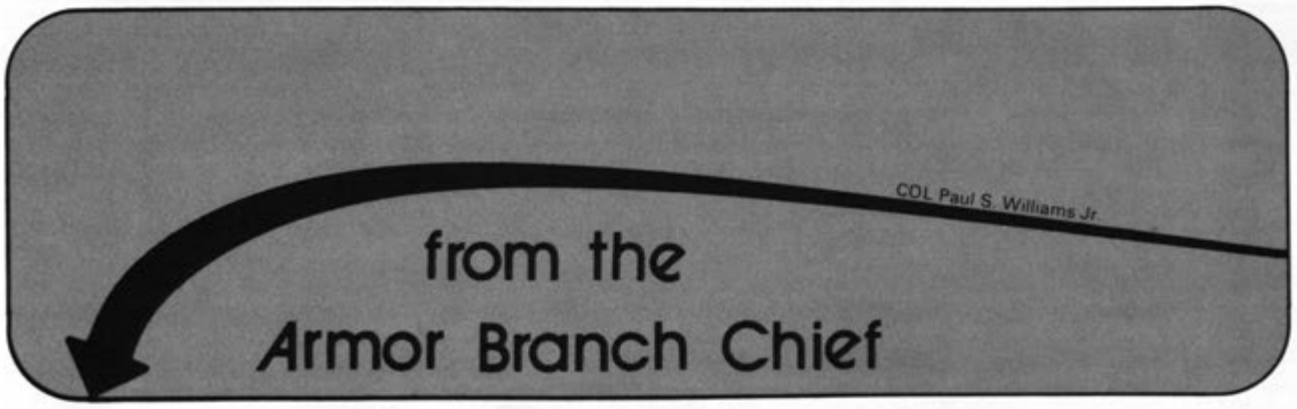
Note. If the personnel were exposed the RV would be 3,500 meters and would cover 100 percent of the battalion.

DISCUSSION:

The personnel radii in the radii of vulnerability table represent the distance from the ground zero at which a few casualties may be expected. Inside these radii, casualty percentages increase rapidly as the distance to the ground zero decreases. In order to reduce their vulnerability, units should consider using one or more of the following courses of action:

(1) Increase dispersion
(2) Depopulate center of position
(3) Use a linear configuration
(4) Increase protection

The course of action that any unit adopts depends on the mission of the unit, and on the risk the commander is willing to accept. In the situation depicted, the commander's guidance cannot be met; therefore, you would have to recommend one or more of the above actions be taken.



I wish to emphasize that the Branch officers are your work force. We exist to assist you, but we need your help in establishing communications. We are currently calling every brigade/regimental, battalion/squadron commander in CONUS to determine how, within reason, we can help. We will be on every major CONUS post within the next eight months. If you have a question, call, write or visit. We will even accept a message written on a road wheel. If your preference statement is over three years old, you will get it back, and if you are overweight, or your picture doesn't do you justice, you will get a note from me. It's our way of helping you. We want to know your desires, hopes and fears.

Officer Evaluation Reporting System

The Army Chief of Staff recently approved the introduction of a major change to officer efficiency reporting. The change, known as the Officer Evaluation Reporting System (OERS), becomes effective 1 January 1973. The system is the product of extensive research and testing by the Office of the Deputy Chief of Staff for Personnel and the Office of PersonnelOperations.

An integral part of the new OERS is a revised report form (DA Form 67-7) Officer Evaluation Report (OER), which features a visible scoring system for demonstrated performance of duty and potential. Raters and indorsers will work with 100 points each, making a possible 200 points maximum score. A new evalution tool to be introduced with the OER is the periodic publication of the average report score by grade for the officer corps. This information will provide, for the first time, a known "benchmark" from which raters may begin the evaluation of their subordinate officers.

You will no longer wait until you visit Branch or the Office of the Adjutant General to review individual reports. A copy of the completed report will be furnished at the time the report is rendered. You will thus know immediately how you have been rated, and can make a quick, personal determination as to the administrative accuracy of the report.

You will also be furnished your annual average score and a mean score for your grade. Hence, you will know "where you stand" with respect to your contemporaries. It is expected that this information will be useful for personal career planning, since you will have definitive, factual information concerning your relative standing when faced with career choices.

A section of the new DA Form 67-7 contains 16 questions focusing on the rated officer's professional attributes. These questions require "yes," "no," or "needs improvement" answers, but have no corresponding point values. However, DA officials have indicated that this section of the new OER will receive "due consideration" by DA managers and boards. Only "no" and "needs improvement" answers will require narrative comment by the rater. While the indorser will not be required to answer these questions, he may comment on them if desired.

Other features of the new OERS include:

- A description of the rated officer's duties prepared by the rating officer, not the personnel officer.
- Two free-response narrative evaluations on DA Form 67-7 intended primarily to aid assignment authorities and to complement the new Officer Personnel

Management System (OPMS) by identifying areas in which officers have high career development potential.

- The elimination of continuation sheets to the OER. (The only continuation sheets authorized will be those used to document actions taken by the reviewer)
- Retention of the 45-day suspense to HQDA following the end of the rating period.
- Mandatory officer counseling throughout the rating period. (The function of performance counseling will be redefined and expanded.)

To insure that the new evaluation system is fully understood and well received upon implementation, DA has also ordered a comprehensive education program to support the new system. Instruction in officer evaluation will be mandatory in all Army officer service school courses. Envisioned as broad in scope, the formal instruction will include evaluation theories and techniques as well as the mechanics of the new form and system.

Another means through which the evaluation system will be further improved is through the computerized file of OER data which is to be created. The computerized data will not only aid individual officers and DA personnel officials—it will also help assess the effectiveness of OERS and provide a basis for evolutionary improvement. The data base, for the first time, will enable DA managers to identify the rating tendencies and trends of individual raters. Habitually lenient or severe raters will be identified.

All officers are encouraged to consult the revised AR 623-105 for detailed instructions on the completion of DA Form 67-7.

Assignment Policies

With the continued reduction in short tour requirements, we find increased emphasis on personnel stability in assignments. Basic guidance concerning reassignments and stability may be found in ARs 614-5, 614-6, 614-30 and 614-101. Here is a summary of several policies related to assignment stability that may assist you in your planning:

- Except for short tour areas, tenure for battalion commanders remains at a minimum of 18 months; company commanders should expect at least 12 months in command.
- CONUS is the sustaining base for overseas personnel requirements. Involuntary inter-theater transfers will be treated as exceptions to policy and will be made only as a last resort to meet short tour requirements equitably.
- Officers assigned to long tour areas overseas will normally be expected to complete the prescribed tour.
- Officers who are voluntarily extended in long tour areas overseas may upon completion of the long tour be assigned direct to a short tour area without an intervening tour if necessary to meet short tour requirements equitably.
- Officers reassigned to CONUS from overseas will serve not less than one year in CONUS before being involuntarily reassigned to another overseas area.
- Generally, CONUS assignments are for three years. Officers should not expect intra-CONUS reassignment until they have completed at least two years at an installation or activity.

Lieutenant Assignments

While such factors as the decrease in total Army personnel strength (including the inactivation of units) and the curtailment or reorganization of various Army activities will continue to have their effects, several important steps have been taken to reduce the personnel turbulence experienced from 1965 through 1971. Stability is now being given the highest priority in personnel management and is the big word in Armor lieutenant assignments.

The promotion stretchout to first lieutenant and captain will allow lieutenants to gain wide experience in a variety of assignments at company/troop and battalion/squadron levels. Officers assigned to CONUS, Germany and other long tour areas

can expect to spend a normal tour of duty as outlined in AR 614-30 (overseas) and AR 614-6 (CONUS).

Openings are available in Korea for Armor and Armored Cavalry platoon leaders. Officers wishing to volunteer for one of these assignments should call or write Armor Branch. (Major Edward Shaw, 202 693-1474; Autovon: 22-31474).

Calories Count

It is one of our continuing responsibilities to keep ourselves physically fit to perform duties under arduous or demanding conditions. Maintenance of proper body weight is a prerequisite to achieving a satisfactory degree of physical fitness. "Excess body weight may result in substandard performance, may be indicative of failure to exercise leadership by example and precept, and/or may be indicative of apathy, to include inability or willingness to expend effort." (AR 600-7)

Consider these hypothetical examples: "This officer's overall outstanding performance of duty was marred by his gross appearance—he is fat;" and, "This officer was so overweight he could not keep up with his counterpart on several combat patrols." (OER comments on several Armor officers). The point is this: An overweight condition could substantially affect your usefulness to the Army and may influence your non-selection for a key assignment or, in an extreme case, for promotion. If you're not particularly concerned about what a grossly overweight condition may be doing to your health, at least consider what it may be doing to your career.

Indications of obesity may appear in Item 14 (height-weight) of your DA Form 66, in your official photograph, and in your efficiency reports (terse narrative comments or nicks in "appearance.") If you have been, but are not now overweight, an update on your DA Form 66 and official photograph may be in order. On the other hand, if you are overweight now, you should enter a weight reduction program under the guidance of a physician and/or have medical authorities determine the cause of your obesity (it may be a medical problem). If you're in doubt, for a starter check the weight-height-age table in Appendix III to AR 40-501.

Copies of Efficiency Reports

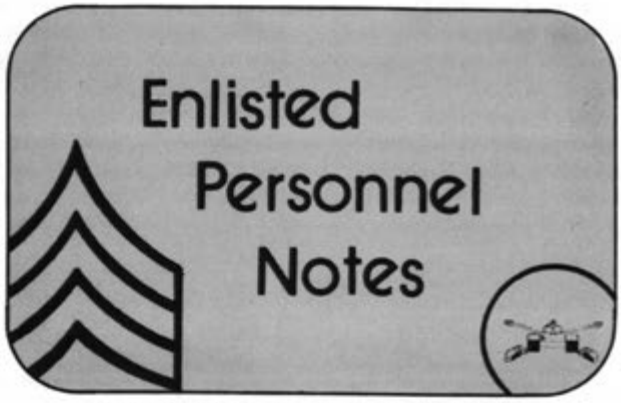
The Office of the Adjutant General, HQDA, will provide copies of efficiency reports to retired or separated officers and those needing copies for official personnel actions. No fee is charged when the copy is to be used in conjunction with an official personnel action, such as an efficiency report appeal. For other uses, $1.50 is charged as a search and reproduction fee for the first six pages. Five cents is charged for each page thereafter. One may obtain copies in person, through an authorized deputy, or by written request. Refer to Paragraph 1-5 of Change 4, AR 623-105, for details.

Armor Branch Move

Armor Branch is now located in Wing 10, Tempo A, 2d and T Streets SW, Washington DC. Although the exact date has not been determined, we expect to move with OPO early next year to the Hoffman II Building located in Alexandria, Virginia, just north of the Beltway (Route 495), Exit 2, at Telegraph Road. We will publish our new address and telephone numbers when the move is imminent. Our current address is: HQDA (DAPO-OPD-AR), Tempo ABC, Washington, DC 20315.

Armor Ball in March

The Washington Area Armor Anniversary Ball is scheduled for 30 March 1973 at the Bolling AFB Officers' Club. If you are new in the Washington, DC area, did not receive an invitation last year, have moved, or are going to be around on 30 March, please send us your address and a contact phone number. Write or call: Secretary (Major Bill Fitzgerald), 196th Armor Ball, Tempo A, Room 1-1021, 2d & T Streets SW, Washington, DC, 20315, (202) 693-0690.



From the Director of Enlisted Personnel

WHY NOT ME?

Did you ever wonder why some soldiers get assignments to Reserve Component units (Army Reserve and Army National Guard) or ROTC Instructor Groups, and you can't? While asking yourself this question, the people in the Office of Personnel Operations at DA, who make assignments for enlisted men in rank of Staff Sergeant (E6) and below, are being asked by the Reserve Component and ROTC units why their vacancies remain unfilled. The reason is that DA has been receiving very few applications from soldiers desiring such an assignment. The lack of publicity for this type of assignment and the jobs available may be one reason why so few applications are submitted. Another reason is that most soldiers don't know that they must submit a volunteer application to get assigned to Reserve Component or ROTC duty.

MOSs presently needed in these assignments are in the Combat Arms career field for instructor and advisor positions and in the following MOSs and grades:

71H40—Personnel Specialist (E6, E7)
76Y40—Unit & Organization Supply Specialist (E5, E6, E7)
71L40—Administrative Specialist (E6, E7)
71H20—Personnel Specialist (E4, E5)
71C20—Stenographer (E4)
71B30—Clerk-Typist (E4, E5)
71L20—Administrative Specialist (E4, E5)

Vacancies exist in every Continental United States (CONUS) Army area for Staff Sergeant and Specialist Five. If you have the desire for one of these assignments, AR 611-50, titled: "Assignment to Reserve Component and Reserve Officer Training Corps Duty", contains the information you need to determine your eligibility. Contact your unit personnel officer for specific details and assistance.

UNFULFILLED ENLISTMENT COMMITMENTS

If your assignment instructions don't agree with your enlistment contract, *speak up*. Some men are enlisted by recruiters for a particular assignment or special training. These commitments are sometimes missed by the people who work in the personnel system. The best step for you is to talk to your squad leader, first sergeant or company commander. He will look over your assignment commitment and send you to the right personnel people if it is in error. One of the first things that he will check is Item 48 of your DD Form 4. This item contains the exact assignment for which you enlisted.

If the assignment or your training is in conflict with your enlistment commitment, it then becomes the case for your commander or possibly the problem solvers at the Office of Personnel Operations in Headquarters, DA. It may be necessary for you to file your claim under the provisions of paragraph 5-5, AR 601-210 and forward your claim on to the Office of Personnel Operations. If your claim is substantiated, then proper steps will be taken to correct your situation.

The Army Personnel System is not foolproof but the Army needs your help to overcome the errors, so *speak up* about mistakes in your assignment.

VOLUNTEERS FOR EUROPE ENCOURAGED

DA recently announced a program soliciting enlisted volunteers for Europe. DA Message DAPE-PDD, "Enlisted Volunteers for USAREUR" DTG 061330Z September 72, was issued to forestall anticipated shortages in Europe during the period of January through March 1973. The program is aimed specifically towards those individuals serving in the United States Continental Army Command (CONARC), United States Army Air Defense Command (ARADCOM), Combat Developments Command (CDC) or the Army Materiel Command (AMC). Individuals desiring to volunteer for assignments to Europe should submit volunteer applications to DA. Lists of critical Military Occupational Specialty (MOS) required in Europe and procedural changes which require commanders to submit all applications regardless of disapproval are included in the program.

It should be noted that notwithstanding this program, all eligible individuals regardless of MOS may volunteer for duty in Europe and are encouraged to do so. Additional information is available through your commander or personnel officer.

NEW EES AID FOR ENLISTED PERSONNEL

DA has recently published a new aid for all enlisted personnel—DA Pamphlet 611-8, titled: "The Enlisted Evaluation System" (EES). It is intended to inform you of how the EES works and what it means to you.

The pamphlet explains the purpose and objectives of the EES, and describes in detail the major elements of the system, MOS Evaluation testing and Enlisted Efficiency Reporting (EER). How these documents are scored and combined to develop the Evaluation Score is well illustrated. The pamphlet tells you the importance of your Evaluation Score and its effect on your career.

This pamphlet is now being stocked by all MOS Test Control Officers. Because of the importance of the Enlisted Evaluation System to you, you are urged to obtain a personal copy.

NEW POR PROCESSING

Since 1 September 1972, soldiers preparing for movement overseas have less qualification items on their POR check list (DA Form 613). A recent DA Message, DAPO-EPP-P, 171300Z August 72 announced the rescission of certain training items which were formerly required under the provisions of AR 612-2, titled: "Preparing Individual Replacement for Oversea Movement (POR) and US Army Oversea Replacement Station Processing Procedures." This training is not being deleted. However, there is no longer a need for these items to appear on the check list since this training is given to everyone in either Basic or Advanced Individual Training.

The eight items deleted from the POR check list are:

- Weapons qualification and familiarization
- Night infiltration course
- Close combat course
- Chemical, biological and radiological (CBR) training
- Code of conduct
- Survival, evasion and escape training
- Geneva and Hague Convention instructions
- Subversion and Espionage Directed Against US Army and Deliberate Security Violations (SAEDA) orientation

MOS RECLASSIFICATION FOR BONUS RECIPIENTS

A recent DA message made a policy change relating to changing the primary MOS of those who have received bonuses for enlistment or extension of service or received a Variable Reenlistment Bonus. It is now mandatory that these changes be made through reclassification board action. For example, if you received a Variable Reenlistment Bonus upon reenlistment, but have become disqualified to perform in that particular MOS, you will appear before a reclassification board which will recommend you be given a new primary MOS.

This DA message, dated 111600Z August 72, subject; "Interim Change to AR 600-200", also adds a new paragraph 2-32d. This prohibits redesignation of primary MOS during the period of service for which an individual has received an enlistment bonus or Variable Reenlistment Bonus except for reclassification described above.

CHANGE TO PORT CALL PROCEDURES

As of 1 November 1972, "direct to transportation" port call procedures were expanded to include all replacement personnel enroute to Hawaii, Okinawa and Japan. Therefore, the only personnel who will be directed to report to a continental United States (CONUS) replacement station for processing and onward movement to an oversea command will be unaccompanied male enlisted personnel in ranks of Private (E1) through Corporal or Specialist (E4) who are enroute to Germany, Korea, Thailand and Vietnam.

All orders-issuing agencies and port call requesting activities should be aware of this change, which was sent to the field by DA Message 221809Z August 72.

STATEMENT OF CIRCULATION

STATEMENT OF OWNERSHIP, MANAGEMENT AND CIRCULATION

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MANAGING EDITOR	
G. OWNER	The United States Armor Association — same address
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I certify that the statements made by me above are correct and complete. — Robert E. Kalec, Major, Armor, Editor

news notes

MG SHOEMAKER COMMANDS 1ST CAVALRY DIVISION

Major General Robert M. Shoemaker, a 1946 graduate of the United States Military Academy, is the new commander of the 1st Cavalry Division (Airmobile) at Fort Hood. He replaces Major General James C. Smith who was assigned to Headquarters, 5th Army, as Deputy Commanding General for Reserve Forces (Northern Area).

MG Robert M. Shoemaker

After receiving his Infantry commission, General Shoemaker commanded rifle and heavy weapons companies until his assignment to Korea as a rifle company commander and regimental S3 with the 23d Infantry, 2d Infantry Division. Upon graduation from the Army Aviation School in 1960, he served with several experimental air cavalry units and with the "Howze Board" which studied airmobility in the Army.

Upon reorganization of the 1st Cavalry Division as an airmobile force, General Shoemaker commanded the 1st Battalion, 12th Cavalry during its deployment to Vietnam and for several months thereafter. From December 1965 to May 1966, he commanded the 1st Squadron, 9th Cavalry in Vietnam, when it was the only air cavalry squadron in the Army.

UNIQUE TANK CREW READIES HANNIBAL

Preparing "Hannibal," a 28-year old *M24* tank, for a shakedown machine gun firing are, from left to right: "loader" Sergeant First Class Robert Stewart; "gunner" Command Sergeant Major George Vaughan; "tank commander" Lieutenant Colonel C.P. Hutton, commander of the 3d Battalion, 68th Armor, 8th Infantry; "bowgunner" Sergeant First Class Charles Hazelip (in tank); and, "driver" Sergeant First Class Eddie Mitchell. Despite ammunition problems, the crew successfully completed the firing test. "Hannibal," a veteran of World War II, was reconditioned by troopers of the 3d Battalion, and is perhaps the only *M24* still operational in Europe.

THUNDERBOLT MARATHON

Brigadier General Calvert P. Benedict, left, assistant division commander, 82d Airborne Division with Command Sergeant Major George Parker and Lieutenant Colonel Robert A. Wolfe, both of 4th Battalion, 68th Armor, holds a mock check representing the battalion's contribution to the Combined Federal Campaign (CFC). This goal has been achieved due to a "Thunderbolt Marathon" in which officers ran one kilometer for the average amount of dollars contributed by their respective units to the CFC.

9TH ARMORED DIVISION RETURNS TO FORT RILEY

The 9th Armored Division colors were encased and placed on permanent display at Fort Riley on 4 July, nearly 30 years from the date the unit was activated at the Kansas post. The division was inactivated in 1945.

LOGISTICS ESSAY CONTEST

The US Army Logistics Management Center is sponsoring the second annual essay contest to promote the advancement of management in the Armed Forces. The contest is open to all Active and Reserve members of the military services, and Defense Department civilian employees except members of the USALMC staff and faculty. Essays must be submitted by 1 March 1973, and winners will be announced on 1 June 1973. All entries become the property of the USALMC. Prizes of $300, $200 and $100 will be awarded. Topics should concern general management, functional management including logistics and logistics functions, or managerial tools and analytical techniques. Submit entries and obtain additional information from: Commandant, USALMC; Attn: Essay Contest; Fort Lee, Virginia 23801.

10TH ARMORED DIVISION HOME AT FORT GORDON

Part of the display for the ceremony making Fort Gordon the permanent home of the 10th Armored Division. The "Tiger" Division holds the honor of having Vice President Spiro T. Agnew as one of its many distinguished former soldiers.

NEW JERSEY GUARD ASSOCIATION HELPS IN COMPLETION OF PATTON MUSEUM

Lieutenant Colonel Edward M. Geiger, left, President of the Army and Air National Guard Association of New Jersey, presents the association's donation of $1,000 for the Patton Museum to Cavalry-Armor Foundation Board of Trustees member, Major General Lawrence E. Schlanser, USA-Retired. Witnessing the presentation are General James H. Polk, USA-Retired, President of the Armor Association, and Joseph D. Heard, the Foundation's Vice President.

FIRST ATTACK HELICOPTER DONATED TO PATTON MUSEUM

The first *HueyCobra* gunship, prototype N209J, has been donated to the new Patton Museum at Fort Knox by the Bell Helicopter Company. The *AH1G HueyCobra* was the first helicopter given an attack designation by the Army.

STANO TRAINING PACKAGE NOW AVAILABLE TO UNITS

Selected subjects on surveillance, target acquisition and night observation (STANO) are contained in a 21-part training package prepared by the US Army Combat Surveillance and Electronic Warfare School. The STANO package is designed for general use by Active Army and Reserve Component units.

Using instructor format manuscripts and containing approximately 600 color slides, each part provides a comprehensive orientation concerning doctrine, organization and employment techniques in support of military operations. Officially designated ST31-150-2, this package is available through CONUS Audio-Visual Centers supporting your unit. If a unit desires to maintain a permanent file, local reproduction of manuscripts and slides is encouraged and authorized.

UNIQUE RE-UP CEREMONY

When Staff Sergeant Wayne Jepson, center, of the 155th Aviation Company at Fort Ord desired to reenlist for six years, he requested that he be sworn in on horseback wearing a cavalry hat and his dress blues. Colonel Alfred A. Zamparelli, Jepson's brigade commander, was agreeable and administered the oath with Sergeant First Class Edward P. Alford, left, as witness.

2D ARMORED DIVISION HONORS 23 UNITS FOR EXCELLENCE

Twenty-three units in the 2d Armored Division received III Corps Superior Unit Awards in a division color ceremony held at Hell On Wheels Field, Fort Hood. Lieutenant General George P. Seneff Jr., III Corps and Fort Hood commander, placed the award on the respective unit's guidon during his review of the troops. The award is presented annually to units at Fort Hood which have demonstrated outstanding performance in all operational phases during the past fiscal year. Also participating in the ceremony were Major General George G. Cantlay, 2d Armored Division commanding general; Brigadier General John A. Maurer, assistant division commander; and Command Sergeant Major Dwight James, the division's command sergeant major.

the tarpaulin

Covers a bit of everything gleaned from the service press, information releases, etc. Contributions are earnestly sought.

TAKE COMMAND

COL James H. Aarestad, 2d Bde, 3d Armd Div. . . **COL Albert B. Akers,** Arty, DIVARTY, 2d Armd Div. . . **COL Lawrence H. Johnson,** CDC Avn Agcy. . . **COL Marshall D. Johnson,** Camp Drum. . . **COL Corydon Wyman,** 3d Bde, 26th Inf Div. . . **LTC James P. Bergen,** 1st Bn, 72d Armor, 2d Inf Div. . . **LTC Peter G. Cei,** 5th Bn, 68th Armor, 8th Inf Div. . . **LTC Patrick D. Chisolm,** 3d Bn, 63d Armor, 1st Inf Div. . . **LTC Denzel L. Clark,** 4th Bn, 2d Bde, Ft Leonard Wood. . . **LTC Robert B. Chapman,** Arty, 1st Bn, 22d Arty, 1st Armd Div. . . **LTC Robert E. Oberg,** 3d Sqdn, 4th Cav, 25th Inf Div. . . **LTC Harold L. Rose,** 3d Sqdn, 5th Cav, 9th Inf Div. . . **LTC Carl G. Smith,** 2d Sqdn, 1st Cav, 2d

Armd Div. . .**MAJ Don L. Hayes,** 334th Atk Hel Co.

ASSIGNED

BG Norman J. Salisbury, 2d Armd Div . . . **COL Edward F. Astarita,** DCSOPS, DA . . . **COL Judson J. Conner,** S&F, ICAF . . . **COL Donald P. Creuziger,** CofS, 1st Armd Div . . . **COL James W. Dingeman,** Leadership Dept, USAIS . . . **COL George H. Isley Jr,** Sr Adv, Ranger Comd, MACV . . . **COL Arthur J. Jacobson,** USATC, Ft Polk . . . **COL Ogden S. Jones Jr,** PMS, Eastern Mich Univ . . . **COL Vincent W. Lang,** MACV . . . **COL John R. Lauderdale,** DCSOPS, DA . . . **COL Jack F. Matteson,** Sr Adv, 23d ARVN Div, MACV . . . **COL Edgar F. Mills,** Adv Gp, Columbus . . . **COL William R. Ponder,** Dep CO, 1st Avn Bde . . . **COL Nicholas Sebastian,** Test & Eval Agcy, Ft Belvoir . . . **COL Charles L. Spettle,** Test & Eval Agcy, Ft Belvoir . . . **COL William T. Tanner,** OTIG, DA . . . **COL Chester Woods,** HQ 8th Army . . . **LTC Nicholas A. Andreacchio,** C&S Dept, USAARMS . . . **LTC S.T. Ashworth III,** CDC LNO, DCSOPS, HQ USAREUR . . . **LTC Gerald Bartlett,** 1st Inf Div . . . **LTC Reno J. Bonomo,** CDC Armor Agcy . . . **LTC Buford Brooks,** C&S Dept, USAARMS . . . **LTC Clark A. Burnett,** C&S Dept, USAARMS . . . **LTC Gailard Freimark,** DCSOPS, DA . . . **LTC Frank F. Grandone,** RMS, Newark . . . **LTC Glenn C. Finkbiner,** G4, 1st Armd Div . . . **LTC John A Hutchins Jr,** Tropic Test Ctr, Panama Canal . . . **LTC Alfred J. Iller,** G3 Avn, III Corps . . . **LTC Raymond L. Jones,** CDEC . . . **LTC Stanley M. Kanarowski,** 1st Bde, 2d Inf Div . . . **LTC Donald Kemper,** CDC Armor Agcy . . . **LTC Joseph A. Levy,** SHAPE . . . **LTC John Mason,** XO, 3d Bde, 8th Inf Div . . . **LTC Wilber L. McPherson,** MACV . . . **LTC Kenneth G. Nielsen,** C&S Dept, USAARMS . . . **LTC James A. Patterson,** AVCofSA . . . **LTC George F. Powers,** C&S Dept, USAARMS . . . **LTC Benjamin B. Russell,** S&F, Arty Sch . . . **LTC Mars Schoonmaker,** JUSMAGTHAI . . . **LTC John Scoggins,** USAARMS . . . **LTC John A. Simpson,** LEDD, USAARMS . . . **LTC S.R. Sydenham,** MAAG, Denmark . . . **LTC William C. Thompson,** MACV . . . **LTC Donald B. Vought,** MAAG, Iran . . . **LTC Richard B. Young,** Arctic Test Ctr . . . **MAJ Charles D. Acree,** ACSFOR, DA . . . **MAJ Robert C. Barron,** MASSTER . . . **MAJ Norman E. Beatty,** USAARMS . . . **MAJ Thomas J. Canavan,** HQ CONARC . . . **MAJ Larry C. Cogan,** HQ CDC . . . **MAJ Elliott G. Fisburne III,** DCSPER, DA . . . **MAJ James A. Garnett,** OPO, DA . . . **MAJ David V. Harback,** MASSTER . . . **MAJ Edward D. Hart,** HQ AFSOUTH . . . **MAJ Michael J. Hatcher,** CDEC . . . **MAJ James N. Hill,** Adv Gp, ANG, Helena . . . **MAJ John B. Hubard,** Armor Engr Bd . . . **MAJ Paul C. Hutton II,** OSA . . . **MAJ Alvin W. Kremer Jr,** SHAPE . . . **MAJ James A. Marek,** Autmv Dept, USAARMS . . . **MAJ Richard W. Mattes,** C&S Dept, USAARMS . . . **MAJ Coleman McDevitt,** 2d Sqdn, 17th Cav, 101st Abn Div . . . **MAJ Larry J. Medley,** HQ MDW . . . **MAJ Hugh B. Mulvaney Jr,** Adv Gp, Indiantown Gap . . . **MAJ Billy C. Phillips,** Inf Ctr . . . **MAJ Mark T. Pilgrim,** SMA, Ft Bliss . . . **MAJ Robert A. Rasch,** C&S Dept, USAARMS . . . **MAJ John A. Reichley,** PIO, HQ 1st Army . . . **MAJ David P. Schlieper,** HQ 8th Army . . . **MAJ James E. Smock,** Wpns Dept, USAARMS . . . **MAJ Delbert M. Straub,** 3d Sqdn, 5th Cav, 9th Inf Div . . . **MAJ Richard C. Stubbs,** USAARMS . . . **MAJ Gene A. Teany,** MACV . . . **MAJ George J. Telenko,** CDEC . . . **MAJ Carl A. Wesneski,** LEDD, USAARMS . . . **MAJ Eugene R. Vigelis,** LEDD, USAARMS . . . **CSM Dana Brookover,** 194th Armd Bde . . . **SGM Heinz Fischlein,** 15th Bn, 4th Bde, USATCA . . . **SGM Richard M.J. Gassard,** 1st Bde, 2d Armd Div.

VICTORIOUS

The **4th Bn, 35th Armor,** commanded by **LTC Billy J. Wright,** had the highest percentage of qualifying tank crews in the 1st Armd Div during the FY 72 TCQC. A total of 32 crews qualified; 13 as combat ready with distinction. . .The **"City Tankers"** of Berlin, **Co F, 40th Armor,** recently fired their 3d and 4th platoons on Range 80 at Grafenwoehr. Highlights: Of the 11 tanks and crews participating, all qualified; six with distinction, with one crew firing a record breaking score of 2,340, the highest score ever fired by an American crew on Range 80. . .A former scout pilot with **F Trp, 4th Cav, 1st Avn Bde, CPT Ronald A. Radcliffe,** has been named "Army Aviator of the Year" by the Army Aviation Association of America. Named "Army Aviation Soldier of the Year" was **SP5 Richard G. Hatch,** a member of the **227th Avn Bn, 1st Cav Div. . . Mrs. Robert E. Scotts Jr** was named outstanding lady of AOAC 3-27 wives. . .**SP4 James E. Wells, Co C, 2d Bn, 63d Armor,** was named Trooper of the Quarter at Ft Riley. . .**2LT Thomas E. Myers,** Distinguished Graduate of Motor Office course 1-73, whose 99.7 is the highest academic average in the history of the Motor Officer course. . .**Mrs. Natividad Escobedo** and **Mrs. Charles Slimowicz** will share the 1973 Ft Knox Military Wife of the Year title. . .**MAJ R. William Highlander** and **MAJ Michael J. Williams** received first place awards for research papers in journalism at the annual convention of the Association for Education in Journalism. . .**Mrs. Raymond E. Geer** has been named by Army Community Service at Ft. Huachuca as the top volunteer of the year. . .Recent Distinguished Graduates of AOB and Motor Officer courses: AOB 14, **1LT James J. Erb;** AOB 16, **2LT Scott Schapman;** AOB 1-73, **2LT Ronald E. Batchelor;** MO 14, **CPT Donald W. McKenzie;** MO 3, **2LT Daniel J. Baur;** MO 1-73, **2LT Thomas E. Myers;** MO 2-73, **2LT Michael A. Langston.** . .Distinguished Graduate of NCO Basic Class 4-72 was **SGT David W. Davis.** . .**SSG Glenn E. Starks** was the Distinguished Graduate of NCO Basic Class 1-73. . .Members of AOAC 3-72 who were selected for Armor Association Writing Awards are: **CPT Donald Davis; CPT William G. Ginac; CPT John P. Kuspa; CPT Larry A. Loftus; CPT George T. Raach;** and **CPT Charles E. Tompkins.**

AND SO FORTH

Carlisle Barracks is the first post to have **100 per cent** of all Armor officers as members of the **Armor Association . . .** New managing editor of *ARMOR* is **2LT**

James F. Stangle, a University of Dayton graduate who played in the East-West Shrine game in 1969 as an offensive tackle . . . The **7th Sqdn, 17th Cav, 1st Cav Div** has been activated at Ft Hood with **LTC William Beatty** as squadron commander . . . **LTC William H. Roche Jr** has been designated aide to the Secretary of the Army . . . The **3d Sqdn, 4th Cav, 25th Inf Div** has been activated with **LTC Robert E. Oberg** as squadron commander . . . **LTC Harold L. Rose** is the squadron commander of the newly activated **3d Sqdn, 5th Cav, 9th Inf Div** . . . **BG William R. Buster** has been elected president of the **2d Armd Div Assn** . . . **COL James H. Leach** recently retired and became the assistant to the director of the Washington office of Teledyne-Continental Motors . . . **Libya** is awaiting delivery of **40 Czech-built T54** tanks at a cost of $6 million . . . Commandant of the **3d Armd Div NCO Academy** is **SGM Billy Dean Perry** . . . Troopers from **K Trp, 3d Sqdn, 3d ACR** aided the residents of Ysleta, NM when heavy rains threatened to overrun the community . . . **MG Henry W. McMillan,** has been elected president of the **National Guard Assn** . . . **LTC Barron Castellano** of the 50th Armd Div had a role in the movie, *The Godfather* . . . **Robert E. Levy** has been elected president of the **4th Armd Div Assn** . . . The **1st Cav Div Assn** will move their offices from Albuquerque to Ft Hood . . . New president of the **5th Armd Div Assn** is **Anthony J. Oriti** . . . **2d Bn, 34th Arty** has arrived at Ft Knox to become a part of the **194th Armd Bde** . . . **MAJ Dorothy M. Gorlicki** is the first woman to be assigned to the **2d Armd Div** . . . **GEN I.D. White** has been elected a Trustee of Norwich Univ . . . **Rodney Hession** was elected president of the **3d Armd Div Assn** . . . Ft Irwin was recently turned over to the **California National Guard** as a permanent training site . . . **20 women college students** were awarded Army ROTC scholarships . . . **Leo Jarosz** has been elected president of the **10th Armd Div Assn** . . . The **Washington State Legislature** has authorized a **$250 bonus** for Vietnam veterans or their surviving dependents . . . **COL Richard C. Fitzpatrick** was elected president of the **25th Inf Div Assn** . . . The Army's highest position for an enlisted man will be vacated 1 Feb 73, when **Sergeant Major of the Army Silas L. Copeland** retires after over 30 years of service.

from the bookshelf

THE MILITARY AND AMERICAN SOCIETY

by Stephen E. Ambrose and James Alden Barber Jr. The Free Press. 322 pages. 1972. $10.00.

This book collects a series of articles covering the inter-relationships between the military and the rest of society with a focus on the period since World War II. Interspersed are a series of articles by the editors: introductory, summary and/or expository. The author's contributions struck me as the best parts—the most pertinent and interesting observations.

Both author/editors are professors with interests in military matters. Stephen E. Ambrose is professor of History at Louisiana State University and the author of several books on American military history. James Alden Barber Jr. is on the faculty of the Naval War College.

I sense the editors' intent to be interesting without being sensational or unfair—to present controversial views but balance them against different opinions. They've succeeded well even when they've had to compose the counter arguments themselves.

The selected articles are spotty in quality. Some perceptive—some drivel. I am again surprised at how many foolish or blatantly biased articles have been accepted by publishers as fit to inflict on the public. In the military-industrial complex section of this book, for example, John Kenneth Galbraith tortures his logic to conclude that military and industrial leaders get together and decide what they want and then issue necessary instructions to the Congress. "The public accepts what is decided and pays the bill." Conveniently overlooked are the executive, legislative and press trials and nibbles each proposal endures and the fact that national defense needs as perceived by the most expert military forecasters drive the requirements train —not any conference with industry.

Another example, author Ambrose implies that we really didn't need to get as excited as we did about Stalin and communism after World War II and that Stalin was not really another Hitler. Although this is a viewpoint that has some advocates, especially in academic circles, it reflects a flagrant revision of history, not a more sophisticated understanding of what happened in the late 40s and 50s. The same should be said about the thesis that foreign aid was designed to avoid a depression; and that military propaganda is so overwhelming that it is not and cannot be effectively countered. That last point, made on page 12 of this book, will amuse or enrage most military men used to seeing anyone's views on military affairs soberly offered to the public as gospel—except that of the uniformed professional. For example, this 310 page book does not contain a single piece by an Active Duty military man.

But I don't want to be overly negative. The editors are fair in their editing and their writing. Although the material they have selected is often controversial or even far out, it is clear to the reader that it's only one man's opinion.

The book has nine sections, each containing one to four articles, addressing such topics as foreign policy, race relations, ecology, etc. Each section is interesting. I found particularly interesting the sections on the military-industrial complex and race relations.

There is an overall sheen of hardware and numbers which often squeezes the Army out of the picture as the least hardware-oriented service. Most authors and experts seem to find it easier to think of military power in terms of numbers. They don't comprehend the importance of spirit and leadership.

But there is enough Army focused material to make it worthwhile reading for the Army professional. We should know what's being written about us even if some of it's wrong. Some of it could be right, too. And much of this book is favorable. The authors' conclude that the military does not dominate our government and that it does make socially useful contributions. Thanks fellows.

Brigadier General John F. Forrest
Director of Officer Personnel

THE MILITARY ESTABLISHMENT: It's Impact on American Society

by Adam Yarmolinsky. Harper & Row. 434 pages. 1971. $10.00.

The title of Mr. Yarmolinsky's book might lead one to suspect the volume contained an attack on the military. It does not. Neither is the volume an in-depth study by one man. As the preface states, "It is actually the work of many hands." Unfortunately the book's chapters reflect the "too many cooks," running from scholarly research pieces (The Traditional Federal Role in Domestic Disorders) to jazzy little pieces (The Pentagon's Handling of News) pontifically stating, "the public gets the information it wants to hear." So while the volume does have interesting and useful material stuck away in many of its chapters, continuity is lacking and the volume is more a compilation than the author' s best thoughts. As a result, *The Military Establishment* might best be read in small pieces to wind down before sleeping as opposed to during working hours.

If forced to identify a few central themes of the rather elephantine volume, the first would be that our military establishment does touch many lives. The influence on various facets—the Executive Branch, the Congress, industry—are clearly set forth, although some examples are rather ludicrous: "United States Ambassadors abroad have to ask for rides in their military attache's aircraft." Also worth reading is the dissertation on "Military Involvement in Foreign Policy" which is an interesting analysis of the entwinement of the military and foreign policies. This portion contains such rather blithe statements as "the Pentagon can out-perform the State Department in staff work on foreign policy problems . . . it appears unlikely the military establishment will be supplanted in this sphere."

The chapter on "The Military Service and the Social Structure" comes close to justifying the military solely as an educational institution. The discussion reflecting social and educational mobility present in the military and the following

chapter on "Military Service and Race" likewise fully credit the military with productive attitudes and accomplishments.

Less distinguished chapters include the one on "Military Justice and Individual Liberty" which includes the judgment that veterans find a "stigma" associated with a dishonorable discharge. The chapters on "The Traditional Federal Role in Domestic Disorders" and "Use of Troops in Recent Domestic Disorders" are filled with historical data, but rather laborious in treatment.

The final chapter, "How Much Is Enough?," apparently written by the author, is more interesting, as it is pinpointed to the book's topic and presents thoughts for the future as opposed to historical coverage. The quote from de Tocqueville, "The remedy for the vices of the Army is not to be found in the Army itself, but in the Country," might be the best line in the book.

In short, *The Military Establishment* is not a book to cause one to rush to the bookstore. Rather, if a friend has an extra copy, selected chapters are worthy of an hour's brousing on a stormy day.

Brigadier General Thomas W. Bowen
Director of Intelligence Support, ACSI

THE BATTLE FOR JERUSALEM: June 5-7, 1967

by Abraham Rabinovich. Jewish Publication Society of America. 471 pages. 1972. $6.50.

This book is a disappointment even though its subject is interesting and its author, a professional journalist, based his narrative on personal experience and over 300 interviews with Israeli soldiers and civilians. The ingredients for a popular historical work on the order of "The Longest Day," were there. Unfortunately, Mr. Rabinovich did not take advantage of them.

His portrayal of the tension-ridden period leading up to the battle was dull. His inability to maintain reader interest stemmed primarily from his apparent desire to include as many personal accounts as possible in the early chapters. Many of these were insignificant and did nothing for the book.

As the battle was joined, the story improved. The most interesting and moving chapter in the book deals with the Israeli paratroopers' attempt to capture Ammunition Hill, a key Jordanian position just beyond the Israeli border. Here Mr. Rabinovich proved to be very adept in portraying the confusion that exists at the unit level in close combat and the total isolation the individual soldier experiences during intense action. Unfortunately, as the battle drew to a close, the reader was again provided with a dull tale, as the last chapters were a mishmash of sentimentality.

Perhaps someone will eventually write a book concerning this decisive moment in the history of modern Israel. Hopefully the author will dwell on the tragedy of war as it affected Israelis and Jordanians. We'll just have to wait for it.

Lieutenant Colonel Thomas H. Tait
OPOAR

JOURNEY BETWEEN TWO CHINAS

by Seymour Topping. Harper & Row. 459 pages. 1972. $10.00.

Journey Between Two Chinas is the account of Seymour Topping's experiences as a war correspondent in China from 1946 to 1949, contrasted with his experiences during a five-week visit to mainland China in May and June 1971. In addition, Topping, who was also a correspondent in Indochina from 1949 to 1951 and chief *New York Times* Southeast Asian correspondent from 1963 to 1966, comments on the genesis of the Vietnam War and on the background to publication of the Pentagon Papers.

The principal criticism of Topping's otherwise excellent book is that it reads like the accounts of a wide-eyed innocent rather than an experienced reporter. No doubt Topping was flattered by the attention paid by Chou En-lai and other high-ranking Chinese officials—including their arranging a birthday reunion in China with Topping's wife. But Topping should not have allowed these attentions to dull and blunt his critical faculties. One expects more from an experienced reporter who has served as foreign editor and is now the assistant managing editor of the *New York Times*, probably the most influential newspaper in the world today. A man of his acumen must have been aware that he was being used as an instrument of Chinese "people-to-people diplomacy" on the eve of the Presidential trip to Peking, but this is not reflected in his writings.

Professor Paul Craig Roberts, in an article in the July 1972 *Intellectual Digest*, hit at the crux of the matter. "Why is it," he asked, "are we relativists in judging the Communists and absolutists in condemning ourselves?" This "two-faced morality" mars what could have been a valuable book.

Topping is impressed—rightfully so—with the immense gains and great improvements that China has made since 1949. But his harping on contrasts with the "bad old days" belies the immense gains and great improvements that have also taken place on Taiwan since 1949—at much less cost in pain, suffering, human dignity and freedom. While applauding the advances made under Chinese Communism since 1949, Topping is surely aware of the advances made under capitalism since 1949—in Japan and South Korea, for example.

Topping's rather uncritical acceptance of many totalitarian aspects of Chinese society stand out in vivid relief if one merely changes all references to "Mao Tse-tung" to "Chiang Kai-shek" . . . read "Chiang Kai-shek thought," for example, or the "Cult of Chiang Kai-shek." Why should one accept from "Mao" what one would condemn if practiced by "Chiang."

The real contrast that should be made is between the progress made by the Chinese under Mao with the progress made by the Chinese under Chiang . . . or, for that matter, with the progress made by the Chinese under Lee Kuan Yew in Singapore. This is not to deny that real progress has been made on the mainland, but it is to question whether the enormous price paid by the mainlanders was absolutely necessary.

It takes remarkable *chutzpah* for Topping, after seeing the draconic control the Chinese exercise on the mainland, to write, "Under the Chiang Kai-shek Government, the native Taiwanese had prospered economically, but they had been repressed politically . . . I felt that the native Taiwanese might in the long-term profit by opting for stability by returning to the sway of Peking . . ." Topping could profit from his own conclusion: "If we have learned anything in these last two decades, I hope it is the realization that one people cannot impose change upon another. If there is to be lasting change, it can only come from within a society." This maxim applies to the 15 million people on Taiwan as well as the 800 million on the mainland.

Given all of these criticisms, Topping writes very well. His interviews with Chinese leaders and his first-hand accounts of mainland China today are most

interesting. It is a triumphal account of the return of the young correspondent who, rebuffed by the Chinese Communists when he attempted to report from behind their lines in 1949, wrote, "I felt, in a sense, that I had been the first envoy of the United States to Communist China, and I had been spurned."

Given the tone of *Journey Between Two Chinas*, it is a good bet that Seymour Topping won't be spurned again.

Lieutenant Colonel Harry G. Summers Jr.
DCSOPS

Colonel Summers is a regular reviewer for the Kansas City Star *and currently has the China Desk in the Politico-Military Division, DCSOPS.*

THE GENERAL WAS A SPY
by Heinz Hohne and Hermann Zolling. Coward, McCann & Geoghegan. 347 pages. 1972. $10.00.

For a man who spent the great majority of his career submerged in the anonymnity of espionage and intelligence during three decades serving many masters (Hitler: 1940-45, CIA: 1946-55, Germany: 1955-68), General Reinhard Gehlen has certainly captured the literary spotlight lately. *The General Was A Spy* is the second recent work chronicling the shadowy world of men "out in the cold" (the other: *Gehlen: Spy of the Century* by E.H. Cookridge), and the end isn't in sight yet. Far from it. The Hohne-Zolling collaboration, in fact, has spurred Gehlen into penning his own memoirs, recently published (*The Service*), apparently to set the record straight once and for all.

What emerges from this history will not, in all likelihood, be overshadowed by the Gehlen memoirs (which I haven't read), because the authors, editors of Germany's prestigious *Life*-like *Der Spiegel* Magazine, have investigated thoroughly and have translated their findings, in highly readable prose, into a book that should receive widespread attention everywhere. The story is fascinating: and if, somewhere along the line, the authors fail to capture the essence of Gehlen's character it's understandable: Gehlen is, after all, the most mysterious personality on the European Continent.

Survival, ingenuity and foresight mark the perimeters of the Gehlen mystique. His uncanny ability to translate these traits into action signal his seemingly meteoric rise. Once threatened by Hitler with internment in a lunatic asylum (surviving through General Heinz Guderian's intercession), Gehlen went on to build the most formidable spy apparatus in Europe during and after World War II. As head of the Foreign Armies East Department of the German High Command, the chameleon-like Gehlen spent World War II building the extensive intelligence system in support of Germany's war on the Eastern Front. There was little about Russia's political, military or economic life that Gehlen didn't know. And this knowledge was centralized, carefully squirreled away in the mountains of Bavaria, and used to transform Gehlen from an exalted position in the Third Reich to the chief European operative of the CIA.

In 1955, Gehlen's organization became the intelligence service of the German Federal Republic; but, according to the authors, the organization wasn't efficient. Its decline—Gehlen's, too—was culminated with the Felte Affair, the penetration of Gehlen's BND (Bundesnachrichtendienst) by a member of the East German Intelligence Service whose long-term (10 years) transmissions eastward signaled Gehlen's retirement in 1968.

While the book is, in itself, an accomplishment of the first rank, the reader receives an additional bonus in the form of a 25-page appendix, tracing the historical development of the German espionage experience from the 18th Century to the present day. It is not only worthwhile on its own merit, but offers a clue to Gehlen's rapid fall: the German traditional belief that espionage and military intelligence were one and the same thing, a condition which led to basic misunderstandings about the use of intelligence in a cold war.

Major John G. Fowler, Jr.
Providence College

HARVEST OF DEATH
by Neilands, Orians, Pfeiffer, Vennema and Westing. The Free Press. 304 pages. 1972. $10.00.

Five scientists have chosen to reveal what they consider to be the harmful and immoral consequences of American use of riot control agents and chemical herbicides in Vietnam and Cambodia. They provide the reader with a potpourri of information on chemical warfare, the effects of these weapons on the people and the land in Vietnam and Cambodia, recent national policy decisions on chemical and biological warfare, and the Geneva Protocol of 1925.

The authors, as scientists before them, seek to air the abuses that in their view have been committed to the discoveries made by scientists. Hence, their views are unanimously negative. All are bitterly critical toward the US for its use of these weapons in Indochina. Indeed, Dr. Neilands doesn't hesitate to forewarn readers that "Gas Warfare in Vietnam," one of the segments of the book, is not an impartial discourse on gas warfare.

A good portion of the treatise revolves around the interpretation of the Geneva Protocol of 1925, with respect to riot control agents and herbicides. To them, the US government is in violation of International Law. According to Dr. Neilands, the "matter of the relation of tear gas and herbicides *vis-a-vis* the Protocol seems to have been finally resolved by a resolution moved at the United Nations in December 1969." Yet, Dr. Neilands omits acknowledging that only about half the members of the United Nations are, in fact, parties to the Protocol. It would, therefore, be odd for nations not parties to the Protocol to interpret its meaning.

Perhaps *Harvest of Death* will serve as a catharsis for its authors. For in their relentless pursuit against the use of riot control agents and herbicides, the authors, by their own admission, consider that the scientists who have helped to create these weapons have been betrayed. Yet, nowhere do the scientists acknowledge what has been amply demonstrated—namely, that these weapons have saved the lives of American and Vietnamese soldiers.

Seymour Waxman

THE ISSUES OF SURVIVAL
by D.F. Fleming. Doubleday and Company. 124 pages. 1972. $5.95.

Dr. Fleming considers life on earth in dire peril; the major causative factors being pollution, the population explosion, armaments, conglomerates, US Foreign Policy and the US Military Establishment. The US, except for demographic considerations, is portrayed as the major malefactor. Fleming presents an emotional plea for the US to withdraw, to a large degree, from the international arena and look inward. He suggests that regulatory world agencies with enforcing powers must be developed to bring pollution, population and armaments

under control. In the interim, the US should concentrate on domestic issues.

Pollution is credited primarily to technology, disregard for the natural environment and inefficient waste disposal. A partial solution proposed is the development of an efficient public transport system, and subsequently, outlawing the internal combustion engine. In addition, all efforts to produce a supersonic transport should cease, and the necessity for recycling waste is stressed.

Fleming believes population growth should be controlled. A suggestion that he offers is a penalty tax for families with more than one or two children.

Nuclear and missile technology, according to Fleming, have made defense of national boundaries obsolete. Arms limitations must be established. Reductions in existing armaments is viewed as essential and a considerable portion of the resources allocated to armaments should be redirected to improving the environment. Strong regulatory world agencies are considered a must.

US conglomerates, foreign policy and the Defense Community are viewed as the major cause of most of the domestic and international problems of the country. Foreign policy, according to Fleming, is shaped largely to the desires of US industry and the Defense Establishment to carve out economic and military empires, and has caused the US to become imperialistic and morally corrupt. He also attributes the Vietnam Conflict to the policy of containment—in his view, a tragic mistake.

As corrective measures, he suggests the cessation of all military aid and the transfer of American-owned overseas corporations to indigenous governments. Fleming emphasizes that the US must forget about policing the world and concentrate on domestic problems. He fears the Defense Establishment has become so wasteful and powerful as to threaten individual liberty. However, he foresees the need for the continued existence of a military force; but considerably reduced in size and influence, the subsequent savings being used to treat domestic issues. Other suggestions made by the author, such as the seating of mainland China in the United Nations, appear to have been realized.

The author builds his case on numerous quotes selected to prove the validity of his beliefs. His theme is not new. On the other hand, his obviously biased interpretations of historical facts and events, within the military and foreign policy spheres, are, in fact, very new. An example is his statement that President Truman's announced policy of containment gave ". . . Stalin total power over the Soviet people." Another view not borne out by fact is that the Korean War may have been precipitated by South Korea marching north.

Dr. Fleming has failed to examine both sides of the coin. In many instances, his pleas appear based more on emotion than a hard cold realistic appraisal of the world as it exists. However, the book does focus on major issues; it is thought provoking; and it is worth reading.

Lieutenant Colonel Richard L. Coffman
Army War College

THE THIRD YEAR OF THE NIXON WATCH

by John Osborne. Liveright Press. 216 pages. 1972. $5.95.

John Osborne is considered by many as one of the world's foremost Nixonologists. After spending years on the staffs of *Time*, *Newsweek* and *Fortune*, he finally settled down as White House correspondent for the liberal *New Republic* to write a weekly column entitled, "The Nixon Watch." As one would suspect, his recent book is a compilation of his *New Republic* commentaries written during the Nixon Administration's third year in office.

As a Nixonologist, John Osborne is anything but objective. Whether ferreting out trivia, describing intimate facts about the President to include his famous "cringing smile," or reporting on major domestic issues, Osborne views President Nixon as both scheming and deceitful. He is more merciful when reporting on Presidential forays into international affairs. At one point, when reporting on the September 1971 Nixon-Hirohito meeting in Alaska, Osborne begrudgingly concludes, "I was proud of the President."

In this election year, Osborne's non-objectivity can "turn-on" McGovernites and "turn off" Nixonites. In retrospect, the author's hang-up with what he conceives to be sinister inner drives and intentions of the President is unfortunate, for he otherwise provides readers of all persuasions with an incisive insight into the personalities, the working and structure of government. Although at times guilty of selective inattention, he basically displays imagination and a healthy respect for research as he dissects such diverse issues as: the reason for the President's trip to China; revenue sharing; busing, Civil Rights, desegregation and interaction between the Administration and the Black Caucus; reform of the FTC; the Daniel Schorr Affair; and the Kissinger to Rogers to State Department controversy. Complementing this rather heavy fare is the wit, charm and satire of the Pulitzer Prize winning cartoonist, Pat Oliphant.

Lieutenant Colonel David K. Doyle
OCofSA

NIXON'S QUEST FOR PEACE

by Frank van der Linden, Robert B. Luce, Inc. 238 pages. 1972. $6.95.

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Lieutenant Colonel Donald S. Pihl
OSA

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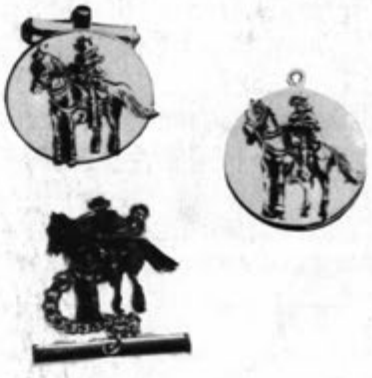

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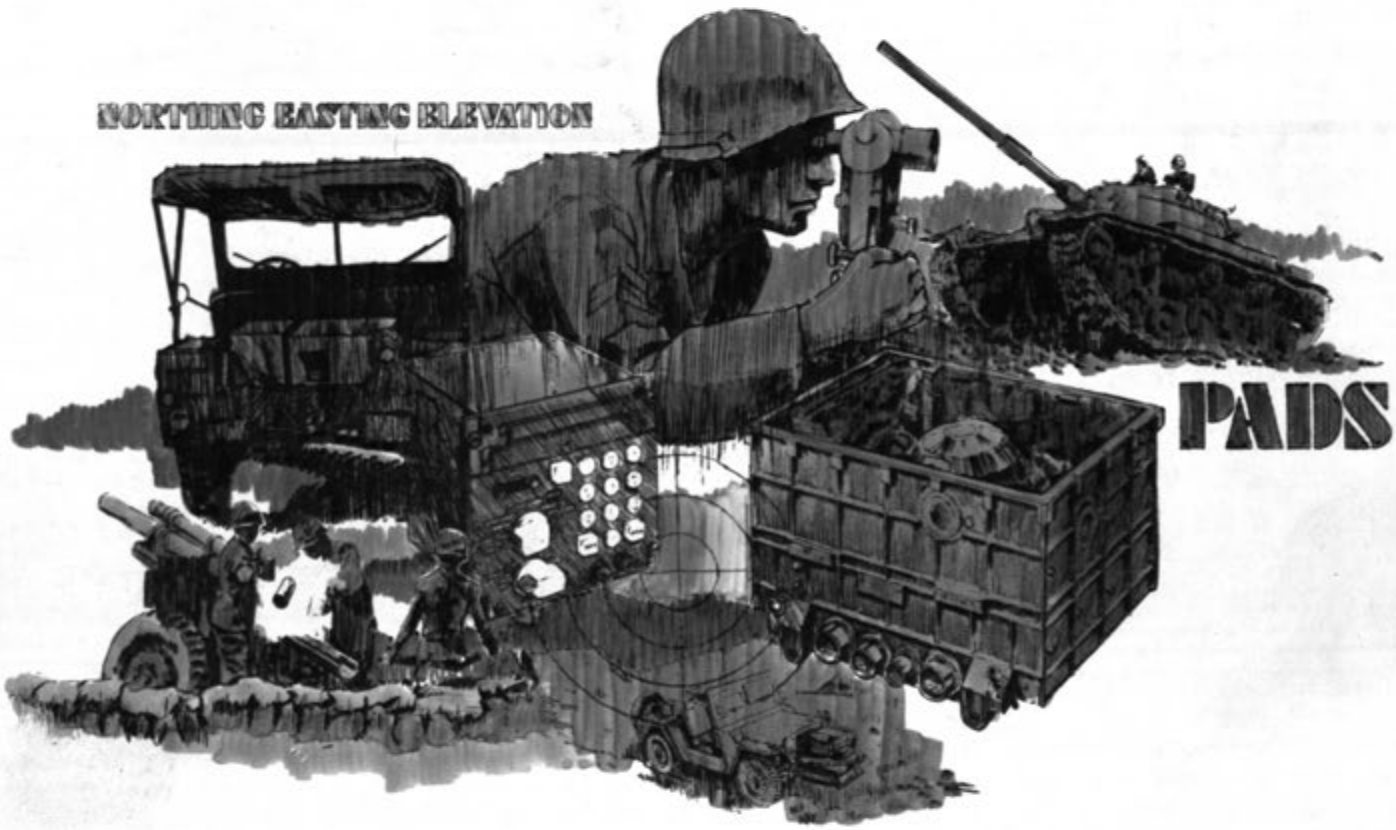

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84th Annual Meeting
The US Armor Association
Fort Knox 10-12 May 1973

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THURSDAY, 10 May 1973

0800 – 1600	Arrival and Registration
1830 – 2200	Cocktail Buffet with the American Ordnance Association (AOA)

FRIDAY, 11 May 1973

0800 – 0815	Honors Ceremony
0830 – 0835	Commanding General's Welcome
0840 – 0910	Keynote Address
0910 – 0950	Presentation by Armor School—"Armor New Developments"
0950 – 1010	Coffee Break
1010 – 1050	MASSTER Highlights and Update
1105 – 1145	Business Meeting
1145 – 1330	Lunch
1330 – 1630	Field Demonstration by Armor School and Training Center
1630 – 1700	Retreat Parade
1700 – 1830	Open
1830 –	Cocktail Banquet with AOA

SATURDAY, 12 MAY 1973

0900	Executive Council Meeting, Red Room, Brick Mess
0900 – 1200	Buses depart Brick Mess, on regular schedule, for those interested in visiting the Patton Museum.

The Fighting Vehicle System Section, Combat and Surface Mobility Division of the American Ordnance Association and the Blackhorse Association will again conduct their meetings concurrently with the US Armor Association. For further information on their activities contact:

American Ordnance Association
740 15th Street NW
Washington, DC 20005

The Secretary
Blackhorse Association
PO Box 11
Fort Knox, Kentucky 40121

ARMOR

the Magazine of Mobile Warfare

Volume LXXXII | March–April 1973 | No. 2

ARTICLES

FEATURES

DEPARTMENTS

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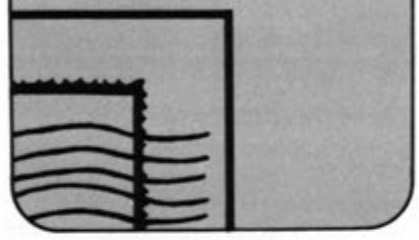
letters to the editor



Secondary Skill?

Dear Sir:

After reading the November-December issue of *Armor* ("From the Armor Branch Chief"), I felt compelled to address the following question: Why isn't Army Aviation considered a Special Career Program?

The article illuminates a point of view held by many non-rated members of Armor Branch and that is, aviation does not qualify as a secondary skill. I would like to take issue with this point of view.

- First of all, the Chief plainly states in the third paragraph that aviation "is not a separate career field, but a Branch skill."
- He states that the OPMS secondary skill "will be in addition to Branch qualification." (Army Aviation qualifies)
- He states that "officers will be given appropriate training and education and placed in assignments to enhance their specialty." (Army Aviation qualifies)
- He states, "The objective of this management concept (OPMS) is to develop professionally qualified officers to fill the Army's key command and staff positions and permit the officer to do what he does best." (Army Aviation qualifies)
- Further, "To qualify in his secondary skill, an officer must serve two assignments in the field or serve one assignment and have a related advanced degree." (Most Armor aviators with one tour in Vietnam and over five years service qualify.)
- And finally, he states, "You will note that aviators are expected to develop a secondary skill in addition to their aviation skill." I submit that this will be one more than our non-rated contemporaries. Armor aviators will in fact be acquiring a third career skill as projected by OPMS.

To contend that aviator qualification does not constitute a secondary skill is to ignore the issue completely. Aviator qualification requires 32 weeks of intensive formal classroom and actual flight instruction. Qualification in a functional staff position requires on-the-job training done twice over.

An area of productivity which has major industry status in the civilian world is certainly worthy of the title "secondary skill" in military circles. Armor aviators equipped with Standard-Instrument Cards are in the same job market category as civilian airline helicopter pilots. Many Armor aviators have qualified for their commercial licenses.

Two additional, related, but distinctly separate skills, include aviation safety and aviation maintenance; both of which require formal schooling over and above that required for similar jobs in ground units.

The point is this: Army Aviation is a special career program, in fact, if not in name, and should be given appropriate billing. I feel that the Army is getting quite a bit of mileage out of its aviators without acknowledging the fact. In addition to acquiring and maintaining the "regular" skills of contemporaries, aviators are faced with a continuing requirement to maintain proficiency in their "other" skill, and face annual qualification tests (both written and flight examinations). How many Armor officers face the equivalent of a Flight Evaluation Board for failure to qualify on the TCQC? How many Armor officers assigned to TOE units are required to undertake the TCQC? Credit should be given where credit is due. Aviators should have an edge at promotion board time. If we are required to develop and maintain three skills or specialty areas, fine; we can do that. But do us the justice of telling it like it is, so our non-rated, anti-aviator contemporaries get the message loud and clear.

GLYNN T. DECOTEAU
Captain, Armor
Fort Knox, Kentucky 40121

Why Not Scorpion?

Dear Sir:

I have closely followed the various mentions of the ARSV in *ARMOR* and am particularly interested by the photographs in the September-October issue, showing the two competing ARSV mockups.

There is obviously an urgent need for the US Army to have a vehicle of this category in service as soon as possible: it will be the only new armored equipment since the *M551 Sheridan* appeared. However, I am puzzled by what, to an outsider, appears to be a rigidity of attitude and an unwillingness to compromise that does not usually go with the flexibility and eagerness of tankers.

The requirement for the ARSV started some eight years ago with a joint project in which the US, Canada, Australia and the United Kingdom were involved. Differences of emphasis caused the two main manufacturing countries to take separate paths, as with the *MBT70*, but as things stand now, the United Kingdom has a vehicle entering service while the US has gone back to square one again to try to work out a method of achieving all the desirable objectives.

Looking at the specifications of the British *Scorpion* and the design requirement for ARSV, there does not appear to be any great difference in the basic vehicle. In fact it would appear that *Scorpion* as it stands, meets about 90 per cent of the ARSV QMR. There are some items in the QMR that would, perhaps, bear discussion.

The vehicle must be able to deal with opposition from infantry and enemy light armor. It is not intended to take on main battle tanks. One weapon must obviously be a medium machine gun, with a reasonable amount of ammunition; at a 600 to 700 round per minute rate of fire, 2,000 rounds gives three minutes or 180 seconds of fire. At two or three seconds per burst, this limits the firing to 80-90 bursts before replenishment is needed.

The main armament of the ARSV should be capable of killing enemy light armor at 1,000 meters. Current Russian APCs have 14mm frontal armor at 45 degrees, but in the foreseeable future this could well become much thicker, and since ARSV will not enter service for six years or more, it should have the capability to destroy vehicles with greater protection than the *BTR50*. This postulates a gun of at least 30mm, capable of firing APDS and HE rounds. The current 20mm cannon does not have this capability and it is very doubtful whether *Bushmaster* will have any better performance. The ARSV is intended to carry 500 rounds of 20mm, which at 650 rounds per minute allows some 20 to 25 bursts—not very much for the 24-hour battle day required of the vehicle, which carries fuel for 450 miles running. The dispersion of 20mm cannon bursts produces spectacular fireworks around the target area, but reduces the lethality per round. Under battle conditions one can expect the basic load to be fired in a very short time, in situations where replenishment could be a serious problem. Without a coaxial machine gun, and with the only machine gun mounted externally, there would be a temptation, in emergencies, to use the 20mm as a hose pipe—with consequent high ammunition consumption.

Weight, size and immunity are closely interrelated. The new vehicle must be an improvement on existing equipment, and the design weight of the tracked ARSV contender is 18,118 pounds, heavier than the *M114*, but considerably lighter than

the *M113* or *M551*. Not surprisingly, ARSV is larger than the *M114* in all dimensions. Studying the mockup pictures printed in *ARMOR* and elsewhere leads to the startling conclusion that its height is between nine and ten feet, which is nearly as high as the *M60*, and is somewhat high for a reconnaissance vehicle. This is presumably necessary to provide the inherent buoyancy of the vehicle, which also means a slab-sided hull. Taking into account the area of plate necessary to make the ARSV hull leads to the conclusion that for a given all-up weight, the immunity is not of a very high order.

Looking at the Alvis *Scorpion* it is easy to see where it does not meet the ARSV QMR. It is not inherently buoyant, but it does swim with the aid of a simple screen. It is also smaller and lighter than the ARSV. *Scorpion's* road range is 50 miles shorter—not a major disadvantage—and its ground clearance is two inches less. On the other hand, *Scorpion* has a more versatile armament, carrying either a 76mm gun or a 30mm cannon, along with a coaxial 7.62mm machine gun. The fire support version with the 76mm gun has a range of up to 5,500 meters and the HESH (HEP) round can disable or destroy any known MBT. The 30mm Rarden cannon fires the existing range of HS ammunition plus two new rounds developed by the United Kingdom.

The APDS round can penetrate the frontal armor of any existing or foreseeable enemy APCs, and the side armor of most existing tanks. For targets so thin-skinned that a solid shot would go in one side and out the other without doing major damage, the AP special explosive round has been designed to penetrate one layer of armor and then explode. The Rarden is designed to fire single aimed shots as opposed to the bursts of the 20mm cannon. Rarden 30mm ammunition is loaded in clips of three rounds and two clips (six rounds) can be loaded at one time. The Rarden cannot be "hose-piped" like an automatic cannon, although it has a limited, slow rate burst capability of up to six rounds. The HE effect of one accurate 30mm round is more lethal than a number of scattered 20mm rounds. Obviously, 30mm AP or APDS has greater killing power than 20mm.

Scimitar, the 30mm armed version of *Scorpion*, carries 99 rounds. The gun has a dispersion of under one mil at 1,000 meters. In both cases, the gunner has the option of using main armament or a coaxially mounted 7.62 machine gun for which 3,000 rounds are carried.

During the early stages of selection procedures for the ARSV, an American firm proposed an Americanized version of *Scorpion*, to be built in the US. It would have been powered by an American diesel engine and the turret would have been adapted to carry the American 20mm weapon system, while retaining the British options if required. This version of *Scorpion* could have been built and ready for evaluation trials by now, and probably in production for service within three years. Of course, the standard British versions would have been available even sooner.

	FMC ARSV	ALVIS *SCORPION*
Weight	18,118 lbs	17,500 lbs
Length	178"	172 3/4"
Width	96"	86"
Height	108" + (est)	82 1/2"
Speed		
Forward	52mph	50mph
Reverse	25mph	50mph
Water	4.5mph	4mph
Range	450 miles	400 miles
HP/ton	30.8	25
Ground pressure	4.2psi	5psi
Ground clearance	16"	14"
Engine	Diesel, 280hp	Gasoline, 196bhp
Transmission	Allison X200	7-speed hot shift epicyclic
Track adjustment	hydraulic	hydraulic
Armament		
Main	20mm	76mm or 30mm
Secondary	7.62mm	7.62mm
Ammunition		
Main	500 rounds 20mm	40 rounds 76mm or 99 rounds 30mm
Secondary	2,000	3,000
Crew	2	3
Verticle obstacle		20"
Maximum gradient		35 degrees (70%)
Airportable at		15,000-16,300 lbs
Trench crossing		6'9"
Flotation	inherently buoyant	collapsible screen
Availability	1978	1973

So I am puzzled by the apparent lack of interest in a piece of equipment that could have met 95 per cent or more of the QMR, based on already proven vehicles available now. I should be most interested to hear the views of American tankers. Are they prepared to wait for more pie-in-the-sky like *MBT70*, or would they prefer a not-quite-perfect solution, meeting a very large part of the QMR, available now? What in fact, do your reconnaissance men really want of their new equipment? I should be grateful for any comments.

N. AYLIFFE-JONES

Surrey, England

Replies To Advanced Main Battle Tank

Dear Sir:

I must take exception to several statements in "Advanced Main Battle Tank," an article in the November-December issue of *ARMOR* by Captain Timothy R. O'Neill, concerning the *M60A2* and its role on the present and future battlefield. In this article, Captain O'Neill states, "The *M60A2's* capabilities are awesome, but its sophistication can be neutralized by poor doctrine and organization." Although the *M60A2* may not be the tank for the 1980s, by considering it only a tank destroyer, and "in no way should it be considered an acceptable interim MBT," Captain O'Neill is falling into the trap he had previously warned against.

The *M60A2*, with its turret stabilization and target designate systems, is capable of engaging all types of targets while going forward, as in the attack; or while moving away, as in the delay. The use of the missile enables the *M60A2* unit leader to greatly extend his capability of fire and movement, or fire and maneuver. To write off the *M60A2* as solely a tank destroyer, regardless of whose definition is used, does a tremendous disservice to the vehicle and its "awesome capabilities."

This vehicle may not be the best tank ever to roll from the assembly lines, but let's face simple facts—we have it, and it is up to the Armor Community to make the best use of it in all facets of warfare, whether offense, defense, delay or whatever.

As S3 Air of the *M60A2* ICTT battalion, I would be more than pleased to keep the Armor Community informed of any developments, both pro and con, concerning our upcoming troop test. But, please, let's not write the *M60A2* off as only a tank destroyer before all the data is in.

JOHN C. GARLINGER
Captain, Armor

Fort Hood, Texas 76545

Dear Sir:

I was delighted to read Captain Timothy O'Neill's article on the "Advanced Main Battle Tank" in the November-December issue of *ARMOR*. He expressed well the feelings of a large number of the younger officers of today's Branch of Decision. There were quite a few who were very relieved at the demise of the *XM803*—especially those who were expected to maintain and operate the vehicle, as well as those who were expected to pay for it. It has baffled me how this great nation can consider producing a tank, 28 years after the Falaise Pocket, still exceeding 40 tons and costing nearly as much to produce as an entire Infantry company. For the cost of an *XM803* tank battalion, the better part of an entire Infantry division can be put into the field.

The tragedy of the *XM803* was not, however, the *XM803* itself, but the whole body of thought and doctrine behind it. Captain O'Neill's article points this out only too well. There has been no significant reevaluation of Armor organization or of Armor doctrine since World War II in spite of the technological advances in antitank weapons technology. TOE changes have been more characterized by the addition of various PPS5 sections, *Redeye* sections, aviation sections, etc., to the point that I question the ability of the battalion commander and his staff to efficiently utilize all this claptrap

in a vague and rapidly changing situation.

To this point, I tip my hat to our brothers-in-arms, the Infantry for their attempts to update their organizational philosophy in the 1950s and early 1960s (such as their experiments with the square, triangular and pentomic divisions). I firmly believe the present battalion and brigade staff structure, which has been with us since the days of General Pershing, needs to be radically changed. Although I am not in complete agreement with Captain O'Neill's proposed AMBT battalion organization, it would nevertheless be a significant step in the direction of greater flexibility and efficiency of control.

The cause of much of this equipment-doctrine-organization debate lies in the never-answered question of what will the Army's strategic requirements be for the next decade or two? We need to find that missing crystal ball which will tell us the location, time and opponent for our next conflict. To further cloud the debate, it appears that the inevitable restriction of funds will prevent the Army from ever attaining the size and equipment level of a completely flexible response. In fact, few strategic thinkers still advocate that role.

The solution can lie only in adopting the equipment and philosophy necessary to give us a highly mobile (strategically, not tactically), nearly instantly deployable force of limited staying power. This philosophy was alluded to, but not well-developed in the book *Alternative to Armageddon* by White, von Manteuffel and Yale. The *XM803* and the *M60A3* become limited purpose vehicles rather than main battle tanks when viewed in light of this philosophy. Priorities would be shifted to the development of armored battalions, equipped with *M551*-like tanks or the AMBT of Captain O'Neill's article, with more limited sophistication (reliability is essential) which could be flown quickly to some remote corner of the world to save some beleaguered embassy or whatever.

In short: Captain O'Neill's article captures the essence of the equipment-doctrinal debate in Armor today and proposes a workable solution to it. It will remain to be seen if this debate is ever decided, or if it will continue to result in improving our ability to defeat von Rundstedt.

JOHN B. HUBARD
Major, Armor
Fort Knox, Kentucky 40121

Dear Sir:

Congratulations to Captain Timothy O'Neill on his fine article, "Advanced Main Battle Tank," which appeared in the November-December issue of *ARMOR*. I agree with Captain O'Neill on the need to get tanks out of the tank destroyer business. Use Infantry and tank destroyers as defensive weapons, and use tanks as offensive weapons.

Captain O'Neill proposed a new tank built within certain design guidelines. Although I do not subscribe to the same guidelines, the tank he asked for is on the market today. It is the Vickers Main Battle Tank *Mark III*.

- Weight—30-35 tons (proposed); 35.7 metric tons (*Mark III*)
- Main Armament—90-105mm with passive night vision (proposed); 105mm with passive night vision (*Mark III*)
- Supplementary Weapon—antitank missile, 3,000 meters (proposed); two *Swingfire* missiles, 4,000 meters (*Mark III*)
- Complementary Weapons—.50 caliber antiaircraft machine gun, 7.62mm coaxial machine gun (proposed); 7.62mm antiaircraft, 7.62mm coaxial (*Mark III*)
- Crew—four (proposed); four (*Mark III*)
- Armor Protection—23mm frontal, 12.7mm flank (proposed); 14.5mm AP at point blank range (*Mark III*)

Additionally, the Vickers MBT *Mark III* has a ground pressure of 12.3 pounds per square inch, and a power-to-weight ratio of 17.85bhp/ton. It is capable of fording 3.75 feet without preparation, or of deep wading or flotation with use of a reinforced nylon screen similar to the *M551 Sheridan's*.

All in all, the Vickers MBT *Mark III* represents a very interesting solution to the light main battle tank problem.

ALFRED T. BOWEN
Captain, Armor
HHT, 2d Armored Cavalry Regiment

G Series TOE

Dear Sir:

I would like to express my disagreement with the letter in your September-October issue from Major Richard H. Merritt concerning the "G Series TOE," specifically in reference to the need and worth of a combat support company.

Major Merritt has obviously had little or no experience with a properly organized and employed G Series battalion with its combat support company. His reaction is similar to that found in uninitiated battalion commanders and operations officers who tend to shy away from changes, and believe only in the old systems they have been taught. Having just finished a 13-month command of a combat support company in the 13th Tank, 1st Cavalry Division, under a battalion commander who had no real previous experience with this type organization, but who readily adapted his thinking and tactical planning to this concept, I find that most of what Major Merritt asserts is incorrect.

The proper employment of the combat support company has both increased and enhanced the battalion commander's span of control and has done the same for the battalion's mobility. The battalion commander has neither lost nor diluted his control of the scout platoon, the mortars or any other support section by having them removed from headquarters company. He has in fact gained, in that he now has a more experienced and better trained officer available to him who can finger any section's exact location and activities, as well as correcting them as required. Thus he has also freed the HHC commander to manage and attend to other areas he has always been responsible for. Now he need only turn to one individual when issuing orders, plans, changes, etc., as opposed to five individuals.

From personal experience I can state matter-of-factly that during any type of tactical operation, the lone combat support commander, if he is organized, can easily manage these assets for the battalion and insure that they are constantly ready to react to the battalion's needs. It should also be pointed out that this type organization allows the battalion commander the latitude of creating an additional maneuver force for economy of force operations, by putting the scouts and HHC tank section together.

In a garrison situation the benefits are even greater. The combat battalion now has its most important support elements in a separate company where they are much less apt to be used as detail personnel and can conduct the necessary training. For all concerned, I consider this the greatest benefit of all. The platoons and sections can be given all the required training with the same benefits and supervision given the tank platoons. Here again it frees all others of the responsibility and lays it squarely on a competent and qualified company commander who can devote his energies to them and not have to divide it up between administration and the host of other areas which fall under the purview of the HHC commander.

There is still another advantage gained by this type organization which is not so obvious. That is that the officers of a combat support company gain a great deal of hip pocket training by working so closely with the S3 in his planning of operations and training. A good S3 and battalion commander get these people involved when and where possible so that they not only fully understand the overall concept of the operations but also gain an insight into the planning.

Therefore, if this is the way we are organized, let's train and fight this way as well. It works and works well as we in the 13th Tank, 1st Cavalry Division have proven time and again throughout operation "Gallant Hand" and all MASSTER testing.

ROBERT K. WHITE
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Armor Center Commander's Update

MG William R. Desobry

FORGE THE THUNDERBOLT—*that is the motto of the Armor School. This Update will briefly review those areas in which the Armor School is "forging" ahead to develop innovative courses of instruction that are realistic, dynamic and academically challenging for all officers, noncommissioned officers and enlisted students.*

There are currently 15 resident courses being taught at the Armor School with a total input this fiscal year of 9,100 personnel. These courses are categorized into *professional development* and *skill courses*. They are:

PROFESSIONAL DEVELOPMENT

Armor Officer Basic Course
(9 weeks)

Armor Officer Advanced Course
(38 weeks)

Armor NCO Basic Course
(12 weeks)

Armor NCO Advanced Course
(12 weeks)

Senior Commander Orientation Course
(Active Duty Personnel) (1 week)

Senior Commander Orientation Course
(Reserve Components Personnel) (1 week)

Special Officer Leadership Course
(Non-US) (18 weeks)

SKILL COURSES

Air Cavalry/Attack Helicopter Commander's Training Course
(4 weeks)

Aeroscout Observer Course
(2 weeks, 2½ days)

Motor Officer Course
(8 weeks)

Junior Officer Preventive Maintenance Course
(1 week)

Senior Officer Preventive Maintenance Course
(1 week)

Track Vehicle Mechanic Course
(7 weeks)

Turret Mechanic Course (*M60A1*)
(8 weeks, 1½ days)

Turret Mechanic Course (*M551*)
(8 weeks, 2½ days)

The *professional development courses* merit the most discussion since they are either new or have undergone major redesign.

Armor Officer Basic Course (AOB). This course, for initial entry lieutenants, trains principally the MOS **1203** Tank Unit Commander. Generally, we seek to produce the "technically qualified" officer through the "hands-on" concept. The idea is old but the technique is relatively new. Each

class is divided into four-man crews and each student crew is issued a tank from the 194th Armored Brigade together with all its tools and equipment which they sign for, operate and maintain for 11 days. From field evaluation, this training method, which has been in existence for over a year, is a best seller at all levels. Recently, a two-week "add-on" period was established for selected officers who can be identified as having a known or potential assignment to armored cavalry units, either in Active Army or Reserve Component units. The two-week MOS **1204** Add-On, as we call it, is but an interim measure pending the start of a 12-week AOB Course which will permit us to train all lieutenants in both the **1203** and **1204** MOS. This 12-week course is now being finalized and it is anticipated that it will start in April 1973.

We returned to a single annual **Armor Officer Advanced Course** (AOAC) this past August as opposed to the four courses per year previously taught. This single class concept permits student enrollment of over 400 officers. The advantages of this course are:

- places students in the summer PCS cycle
- permits our support units to concentrate more intensely during the summer on Reserve Component unit training and other commitments outside the Armor School
- affords the faculty adequate update and rewrite time for AOAC lesson plans and programs of instruction
- realizes a complete semester tie-in with the electives program and educational opportunities with participating universities
- facilitates a fully coordinated guest speaker program
- permits one full school year for dependent children, causing less turbulence in their education.

As of this writing, we note no major disadvantages.

Being the first combat arms school to reinstitute a single yearly advanced course since the Vietnam build-up, we have redesigned the entire program along systems engineering guidelines, permitting us to teach the essential tasks required of an officer at this particular point in his career development. The new course began with diagnostic testing of essential knowledge and skills, generally at the company level, followed by remedial training as appropriate. In the core instruction, we are moving away from the "School Solution" concept and now target more on principle. We also emphasize such topics as dynamic training, management and professional ethics. More emphasis is placed on contemporary problems of the Army such as drug abuse, race relations, military justice, training techniques, etc. The course emphasizes practical work and is oriented on real world problem solving situations. Even the examinations have been revitalized and replaced by two Officer Comprehensive Evaluations (OCE). These duty-related evaluations are given at the end of each of the two semesters. The first semester runs from August to January, with primary emphasis on hardware; while the second semester, running through June, concentrates on soft skill subjects such as command and staff, leadership, etc. Finally, after receipt of orders from Department of the Army, students attend assignment-oriented instruction in one of five areas (TOE units, both command and staff; ROTC; advisor—Reserve Component/overseas; recruiting duty; or service school assignment).

The first step of the NCO Education System, the **Armor NCO Basic Course** (ANCOB) was initiated in late FY 71. This course offers training to selected enlisted personnel for advancement to the E6/E7 level, concentrating on leadership and contemporary problems, and includes hard skill training for both the Armor Crewman (MOS **11E**) and Armor Reconnaissance Specialist (MOS **11D**). Input for the course is generally at the E4/E5 level.

On 26 September 1972, we began the second step in the NCO Education System with our first **Armor NCO Advanced Course** (ANCOA). This course generally parallels the Armor Officer Advanced Course and includes diagnostic testing, remedial training and a comprehensive evaluation. This schooling is designed to train the NCO to fill the positions of first sergeant, operations sergeant and intelligence sergeant. Input for the course is at the E6/E7 level.

The NCO Education System will pay big dividends in the long run, and we think the ANCOB and ANCOA are fine courses—our graduates are exceptional. This summer when our "cus-

tomers" have gained some experience with this product we will evaluate it more fully.

Our newest course is the **Senior Commanders Orientation Course** (SCOC). This branch-immaterial course focuses on contemporary problems in preparing officers for the challenges of battalion and brigade level command. This course will be conducted five times during this fiscal year. Classes are conducted informally using the seminar technique complemented by a varied guest speaker program. This course will be changed periodically, based on student critiques and our evaluation of requirements. A similar course is also conducted for Reserve Components.

Finally, the **Special Officer Leadership Course** (SOL) is designed for training allied junior officers. In the past, we have trained officers from Vietnam and Laos. The students, lieutenants and captains are sent here by their government to learn basic infantry tactics using the weapons found in their nation's inventories. Upon returning home, they normally are assigned to training cadres within their army.

Included in the officer and NCO Basic and Advanced courses is a new Patton Museum theme. Here we provide, as part of the course curriculum, a briefing and tour of the new museum and grounds (See *ARMOR*, January-February 1973). This tour provides each individual with an appreciation for the history of Cavalry and Armor.

Our *skill courses* are generally designed to provide an individual with a new MOS or a special skill. The **Air Cavalry/Attack Helicopter Commander's Training Course** provides commissioned and warrant officers, both rated and non-rated, with a working knowledge of training management, organization, and tactical employment of the air cavalry troop and attack helicopter company.

The **Aeroscout Observer Course** is designed to provide enlisted personnel (Armor Reconnaissance Specialist, **11D**) with a working knowledge of aerial scout techniques. Upon completion of this course an individual receives the Additional Skill Identifier (ASI) **F** added to his MOS such as **11D2F**.

The **Motor Officer Course** (MO) is one of our older courses, but with recent transfer of MOS proponency from the Ordnance School to the Armor School, it has been redesigned using system engineering techniques. Upon completion of the course, a commissioned officer receives the MOS **0600**. This course is branch-immaterial and provides maintenance training on vehicles most closely associated with the officer's branch.

The **Junior and Senior Officer Preventive Maintenance Courses** (JOPM/SOPM) are designed to provide commissioned officers with a general knowledge of the importance of taking command action to achieve an effective preventive maintenance program. The JOPM course is geared toward company/battalion level while the SOPM course is geared toward brigade/division level.

The **Track Vehicle Mechanic Course** (TVM) provides enlisted personnel with a working knowledge of track vehicle maintenance duties at the organizational level. The MOS of **63C20** is awarded to individuals upon completion of the course. To attend this course, a student must be a qualified wheel vehicle mechanic, MOS **63B.**

We currently present two **Turret Mechanic Courses** (TM). They are designed to provide enlisted men with a working knowledge of the organizational maintenance performed on the tank turret system. Upon completion of these courses individuals are awarded MOS **45N20**, if they received training on the *M60A1* turret or MOS **45P20**, if they received training on the *M551 Sheridan.* Programmed for the future is a course on the *M60A2* turret with MOS **45R20** to be awarded upon completion of that course. Incidentally, these three new MOSs will obviate the need for additional identifiers for the *M551*, which proved to be so burdensome for our cavalry units.

In summary, our *skill courses* are quite stable in design and change only when equipment changes or when the needs of the Army change. For example, we no longer teach the Field Radio Mechanic Course—this was transferred to the Signal School, but we are currently expanding in the turret mechanic field.

Aside from the resident instruction, there are other areas in which the Armor School is "forging" ahead. An individual learning center (ILC) was opened on 6 September 1972. This

facility provides enrichment programs, both USAFI and University of Kentucky sponsored, for self-paced instruction. The ILC employs multi-media sound-on-slides and TV cassettes at individual stations for over 100 military programs on a variety of subjects. It also presents college level credit courses. Twenty-two foreign language programs, a complete English program and two reading improvement programs are also included.

With regard to facilities, we are evacuating World War II type buildings wherever student load, new construction and the budget permit. We are putting our resources behind permanent constructions and modernizing to the best of our ability. For example, the new Automotive Department building was opened several years ago while the new Weapons Department building is scheduled for completion and occupation this summer.

My last comments on the Armor School touch on what I and all the staff and faculty believe is a very important by-product which I would label "The Challenge of the Four Dimensions" (Update, March-April 1972). We support two families of MOS: tankers and cavalrymen. Both fight mounted. From that base point, the doctrine differs in many aspects. Now with the "Four Dimensions of Armor," our graduates must become experts in those two MOSs plus their aviation derivatives.

ARMOR readers, I know of no action that we are taking under our instructional charter which has more far-reaching and advantageous application and offers more challenge than the "Four Dimensions" precept just described.

Finally, I am sure that it will not surprise you to hear me say that, we are still in the sorting-out stages resulting from the Vietnam war. Much has been done and much remains to be done in the next 12 months to place, within both the officer and the noncommissioned officer corps, the depth of understanding, professionalism and, for want of a better word, staying power needed for Armor and Cavalry. However, we believe that we are on the right path in this endeavor and by the end of next summer when we have had an opportunity to fully evaluate the results of our current training efforts and further refine our on-going programs, we will be developing, once again, a highly competitive and professionally reliable product.

The Armor School is your School. It belongs to each and every tanker and cavalryman around the world. Be you commander, NCO or individual soldier, your requirement is our foundation for instruction.

The Role of the Mechanized Infantry

by
Major General
Orwin C. Talbott

The concept for the use of mechanized Infantry is one of the most vital areas of development in today's changing Army. It is of concern to all, for in an era of heavy reliance on battlefield mobility, armored firepower and combined-arms combat, mechanized Infantry plays a key role. Every effort must be made to keep pace with the changing complexion of warfare, to keep abreast of developments by others, and to retain a capability to handle any threat that may arise. At all times, we must insure that the Army's Infantryman has the best possible equipment, and that the employment of this equipment is dictated by well-conceived doctrine and tactics.

Mounting Infantry in vehicles came about largely as the result of several innovations: the development of the machine gun in World War I; the development of the motorized and track vehicle; and the ability of armed forces to mass quantities of high explosives in the form of shells and bombs. To survive massed direct and indirect fires, the Infantry increasingly sought cover and armor protection; and to maintain battlefield mobility and superiority, it adopted wheels, tracks—and more recently, air. Today, we rely on both armor protection and mobility for successful mechanized operations, and these two factors will have great influence on doctrine and equipment development for the future.

In discussing the current and future concepts of mechanized Infantry, the first factor to be addressed should be the potential threat confronting us. More than any other consideration, this factor plays a key role in determining our own doctrine, organization and equipment. Without delving too deeply into specific potential threat capabilities, certain postulations are clear.

The potential threat may well have:

- The capability to gather tactical intelligence through spacecraft and other advanced materiel. These items will provide realtime information on a 24-hour a day basis.
- An all-weather capability in combat surveillance and target acquisition.
- A missile/artillery system that is very accurate and highly responsive to ground tactical unit commanders.
- One or more weapons systems capable of destroying opposing aerial and ground vehicles.
- The capability to mass large quantities of aircraft, tanks, armored vehicles and men at any point in time on the battlefield, and be equipped with, and

capable of employing CBR agents, devices and munitions.

• The ability to field more armored or aerial vehicles than the Free World Forces, initially at least.

While accepting the enemy's capability of achieving numerical superiority, our Infantry forces will continue, as and when appropriate, to conduct offensive, defensive and retrograde operations. Imaginative techniques must be developed and tested in each of these type operations, however, to include those concepts fostered by new equipment and materiel.

In order to offset the numerical superiority of enemy forces, the force-oriented defense has been developed and proposed as a defensive tactic to be employed when faced with a combat power ratio so unfavorable to the defender that it makes conventional defense or delay impractical. The concept hinges on trading terrain, not for time but for enemy combat power. In simplified terms, it involves specific organization of the defending force to fully capitalize on mobility, information collection and firepower advantages. In this concept, use of terrain is as important as ever but has a different meaning to the defender; rather than holding specific terrain to preserve the integrity of a rigid battlefield structure, the defender uses terrain only as it facilitates destruction of the enemy. The defender's orientation is on the enemy formations rather than on terrain. Decisive engagement is not voluntarily accepted by the defender. Every opportunity is taken to gain an advantage through offensive action such as spoiling attacks, aerial ambushes of enemy columns with attack helicopters, and short, violent raids along his avenues of approach.

This battle of attrition will be conducted primarily by our mechanized Infantry battalions in the forward battle area, while the majority of our tank forces will be held in reserve at division or higher echelons to preserve a counterattack force of sufficient strength to greatly influence the battle at the most propitious time. The worst mistake that can be made is to lose our tank forces in widely dispersed platoons or sections. We must retain sufficient mass in our tank forces to influence the battle when they are committed. This tank reserve may be used by division commanders in the forward battle area to blunt, stop, cut off and destroy large enemy penetrations if they do occur. The underlying principle, however, is that the attacker's combat power must be reduced to a more manageable ratio before the defender will accept decisive engagement on a large scale.

An insight into how our Infantry will be affected by the potential threat, and how it will be countered, can be gathered from the new Infantry mission statement submitted by the Infantry Team to Department of the Army for revision of AR 10-6:

> Infantry is a basic branch and arm of the Army. Its primary combat mission is to locate the enemy and destroy his fighting capability through the utilization of all available means; closing, as necessary, with the enemy by means of fire and maneuver to destroy or capture him or to repel his assault by the use of all available means of firepower and counterattack. Personnel and units so identified fight dismounted or mounted, according to the mobility means available. The Infantry forms the nucleus of the Army's fighting strength around which the other arms and services are grouped. Through its inherent flexibility, organization, and concentrated training, the Infantry retains a capability for multipurpose employment of conflict. When not in combat, the Infantry retains a state of readiness in preparation for immediate combat worldwide.

MICV

The new mission statement deviates from the Army's previous definition in several key areas, the most significant of which is the increased emphasis being placed on the function of locating the enemy and destroying him at long range with an overwhelming volume of organic and nonorganic firepower. It is envisioned that the function of closing with and destroying the enemy with close combat, while still a primary task of Infantry, will be used only in those instances deemed truly necessary, to include such actions as mopping-up or elimination of bypassed pockets of resistance.

As a result of the importance placed on the function of locating the enemy, increased emphasis is being given to mobility and the use of advanced technology to aid the Infantry in accomplishing this task. To capitalize on the mobility of mechanized Infantry and to increase its capabilities, our current doctrinal concepts, organizations and equipment must come under close scrutiny and be improved or updated as necessary. This is being done on a continuing basis. But while we find our current doctrine to be, for the most part, sound, we are, in many instances, prevented from adequately implementing this doctrine due to equipment shortcomings. Of specific interest is the capability to fight mounted throughout much of the battle area, which, though called for in current doctrine, can only become a reality when the present family of *M113* personnel carriers is replaced by the mechanized infantry combat vehicles (MICV) currently under development. Although the *M113* has proved to be an adaptable carrier and has served well beyond design requirements, future battlefield demands will be such that its mobility, limited fighting characteristics, thin armor and light armament will not permit it to function in accordance with anticipated doctrine.

Doctrine for mechanized Infantry prescribes that the mission may be accomplished by either mounted or dismounted combat, depending upon the specific tactical mission. Operational techniques may vary all the way from purely dismounted actions to predominantly mounted actions such as part of a tank-heavy force in an exploitation where speed and integrity of the force are dominant considerations and the mission permits bypassing pockets of resistance. In the offense, Infantry will move in the MICV as close to the objective as possible in order to obtain maximum protection enroute and to conserve energy. It is critically important to become heavily engaged only in fights that are decisive to the successful accomplishment of the mission. Personnel may dismount for the assault; however, when appropriate, mounted combat will be conducted all the way to the objective. The decision on how to fight (mounted or dismounted) must be the commander's prerogative. The significant doctrinal change caused by the introduction of the MICV is that the combat vehicle will become an integral part of the squad. The vehicle and squad members, whether mounted or dismounted, are continuously mutually supporting. When mounted, the squad has some capability of fighting from the vehicle. When the Infantry squad is on foot, the vehicle supports squad members by use of the vehicle rapid fire weapon system (VRFWS) and organic radio equipment. Whereas employment of the *M113* usually meant the vehicle was used more in the role of a battlefield "taxi," the MICV will be truly a combat vehicle.

Another change precipitated by the MICV is that a separate assigned gunner is required to man the VRFWS full time, allowing the MICV commander the flexibility to control both the squad and the vehicle either from the vehicle or from the ground. The main armament on the MICV is to be stabilized providing the capability for engagement of targets

during vehicle movement. The added option for conducting mounted combat, provided for by MICV, means that the tank-Infantry team is no longer forced to move at the rate of walking Infantry. The momentum of the combined arms operation can be maintained at the rate of battle of the main battle tank (MBT). This will allow the task force commander to fully capitalize on the mobility, firepower and shock effect of the main battle tank. The MICV itself will not become engaged in duels with enemy tanks but MICV mounted squads will do much to provide antitank protection to the whole combined arms force. During the future employment of the tank-Infantry team, unit commanders should recognize the mounted fighting capabilities of the MICV, its ability to fire while moving and its mobility which permits it to travel at speeds commensurate with the tank. This will allow greater flexibility of employment and a more rapid response to changing situations on the battlefield of the future.

The new family of superbly efficient antiarmor weapons, STANO devices, laser technology, the UTTAS and armed helicopters, as well as the MICV and MBT, will increase the versatility of the mechanized battalion to a level of effectiveness not possible in the past. These devices coupled with the integrated battlefield control system and the advent of an all-weather day and night airmobile capability, will enable the Infantry to provide more of its own reconnaissance and security during future combat operations. In post-1980, all Infantry maneuver battalions will conduct nearly all the reconnoitering necessary to satisfy mission requirements and provide unit security. Thus, the special capabilities of Armor can be increasingly used in other missions.

It is envisioned that mechanized units of the future will be somewhat smaller than those currently in the force structure and will provide a greater ratio of combat power to support elements. Offensive and defensive capabilities of mechanized battalions will be enhanced by the use of improved weaponry and increased armor-defeating capability as provided with improved *LAW*, *Dragon*, and *TOW* weapons systems. The provision of substantially increased numbers of antiarmor weapons systems will enhance the capabilities for employment of tank assets in any division of which mechanized battalions are a part.

While the future mechanized battalions will be smaller and lighter, they will possess adequate resources to accomplish assigned missions during normal offensive, defensive and retrograde operations. New technology will improve the self-sustaining capabilities of mechanized battalions and provide for greater firepower than in the past. When necessary, additional support will be provided to the battalion to enhance its combat power; to allow it to perform other tactical missions requiring specialized personnel or equipment or to counter a threat beyond the capabilities of its resources.

The mechanized Infantry battalion of the future in many ways will be the Army's most versatile unit, capable of mounted or dismounted combat to include airmobile operations and any combination of these operations. Its organic antiarmor and integral air defense capability coupled with the mobility and protection provided by the mechanized infantry combat vehicle and ancillary materiel will insure a truly viable force on the battlefield.

Above all, mechanized Infantry will continue to be flexible, dynamic and a vital element in the forces of the Free World. Infantrymen recognize the challenge of the task in the years ahead, and we look forward with confidence to the future of the mechanized Infantry.

MAJOR GENERAL ORWIN C. TALBOTT was commissioned as an Infantry officer with the California National Guard through the ROTC program at the University of California. In 1942, he received his Regular Army commission and became one of the initial cadre of the 90th Infantry Division. General Talbott remained with this division throughout World War II, rising from platoon leader to battalion commander. After completing the Infantry Officer Advanced Course, he was assigned to Infantry Branch and subsequently became Military Assistant to the Assistant Secretary of the Army for Manpower and Reserve Forces. In 1952, he became Military Assistant to the Secretary of the Army. After attending the National War College, General Talbott became senior aide and executive officer to General Lyman L. Lemnitzer, Chief of Staff of the Army. He continued in this capacity throughout General Lemnitzer's tenure as Chairman of the Joint Chiefs of Staff and Supreme Allied Commander, Europe. In 1968, General Talbott became Assistant Division Commander of the 1st Infantry Division in Vietnam and succeeded to command of the Big Red One. In September 1969, he assumed his present duties as Commandant of the Infantry School and Commanding General of Fort Benning.

Brazilian Armor

by richard m. ogorkiewicz

The 150th Anniversary of the Declaration of Independence by Brazil makes it particularly appropriate to consider the developments of armor in that country. This is all the more appropriate in view of the tremendous progress which has taken place in Brazil in recent years, especially since the Revolution of 1964. Two important facets of this progress are the emergence of Brazil as one of the world's major manufacturers of automotive vehicles and the progressive modernization of the Brazilian Army. Moreover, these two developments have led to a third which, from the viewpoint of armor, is the most important—namely, the construction of armored vehicles in Brazil for the first time.

The involvement of the Brazilian Army with armored vehicles goes back, of course, well beyond the present day. In fact, after World War I it acquired a few specimens of the Renault *FT* light infantry support tank from France. This tank was procured at the time by many armies and was copied by, among others, the United States as the six-ton *M1917* light tank. Then, in the mid-Thirties, the Brazilian Army procured a few *L3* tankettes from Italy. The *L3* represented a considerable improvement in mobility over the Renault *FT*.

US BUILT VEHICLES

However, Brazil did not create any armored units until after World War II. During that conflict she did send an expeditionary force to fight alongside US forces in Italy and she began to acquire US military equipment. This acquisition continued after the war and included a quantity of US *M8* armored cars, half-track carriers, *M3A1* light tanks and *M4* medium tanks. This equipment made it possible to create a number of mechanized cavalry reconnaissance units and an armored division stationed in the area of Rio de Janeiro—the capital of Brazil until the dramatic construction of Brazilia where the government has moved during the past few years.

The World War II US-built armored equipment served the Brazilian Army well, but the need inevitably arose to replace it with more modern vehicles. In consequence, Brazil procured a number of US *M41* light tanks. This equipment is now the principal combat vehicle. The *M41*, with its 76mm gun, is not as powerful as the battle tanks deployed by various armies in the Northern Hemisphere. However, it adequately meets the present requirements of the Brazilian Army, and provides it with a modern, mobile tank which should enable it to dispense with the aging *M4* mediums.

In addition to the *M41*, the Brazilian Army has also acquired a considerable number of *M113* armored personnel carriers. This has made possible a partial mechanization of the Brazilian infantry. At the same time, a number of *M108* 105mm self-propelled howitzers were also acquired. All of this equipment has made it possible not only to reequip the armored division with more modern vehicles but also to create a number of independent mechanized brigades.

During the same period, the Brazilian Army began work on the development of armored vehicles. The first step was the modernization of the half-tracks and *M8* armored cars. The original gasoline engines were replaced by Brazilian-made diesels; in the case of the half-tracks the engine was a six-cylinder Perkins diesel, and in the case of the *M8* armored car, a six-cylinder Mercedes Benz *OM321* diesel. In consequence, these two types of vehicles have been retained alongside the more modern vehicles. Studies have also been made concerning the possible modernization of the *M3A1* light tank. This includes the installation of the Deutz *AFL413* V-8 diesel in place of the original Continental radial gasoline engine. These rugged vehicles have been retained in their original form as they continue to be useful as training vehicles.

FIRST BRAZILIAN ARMORED CAR

The second and much bigger step was the design and construction of the first Brazilian armored car, the *Viatura Blindada Brasiliera (VBB).* Credit for its development, as well as the modification of earlier vehicles, belongs to the *Diretoria de Pesquisas e Ensino Tecnico* (DPET)—the Brazilian Army's Directorate of Research and Technical Education. Most of the work done on the *VBB* was done by the DPET section located in Sao Paulo—the Detroit of Brazil and, in fact, of Latin America. Moreover, it was not only logical but historically appropriate that the development of armored vehicles should start in Sao Paulo, as the 1822 Declaration of Independence was made in what is now one of its suburbs—Ipiranga.

The idea of developing the *VBB* arose in 1967; its design started in July 1968; and it was built by the end of 1969. It was a 4 x 4 vehicle manned by a crew of four. It had a two-man turret and was powered by a rear-mounted Mercedes Benz diesel. The design was conventional and represented no technical advance on earlier armored cars. Moreover, only one experimental vehicle was ever built. Nevertheless, the *VBB* was important because it paved the way for the development of other, more advanced wheeled armored vehicles.

ENGESA CTRA

The new wheeled armored vehicles have been designed and built by the Engesa Company of Sao Paulo, working in close collaboration with the DPET. Prior to its involvement in armored vehicles, Engesa acquired a good deal of experience in converting trucks for off-the-road operation and, in particular, with walking-beam rear suspensions. From this basis, Engesa initially designed a 6 x 6 amphibious armored

The *CRR* wheeled reconnaissance vehicle will replace the US *M8* armored cars and the *M3A1* light tanks in the Brazilian Army. Specially designed tires enable the vehicle to travel considerable distance at normal road speed when perforated by bullets.

Capable of transporting 15 men over land and water, the *CTRA* is a 23,500-pound steel-armored vehicle. Two versions are now in production: a Marine model with shrouded propellers and steering vanes; and a model for use by the Army without the water propulsion equipment.

personnel carrier. The model was designated *EE11* and has been called *Urutu* after a Brazilian poisonous snake. However, the vehicle is usually referred to by its army designation *Carro de Transporte sobre Rodas Anfibio (CTRA).*

The *CTRA* is a 23,500-pound steel-armored carrier capable of transporting up to 15 men including the driver. The crew compartment occupies the center and rear portions of the hull and is fully inclosed. There is a large door in the rear hull wall for rapid entry or exit and there are also two large roof hatches. In each side wall there are ports which, when opened, enable the crew to fire from behind armor. There is also the provision for mounting an automatic weapon turret in the center of the hull, and, in its absence, the carrier can be fitted with a simple machine gun mounting.

The front part of the hull is taken up by the engine compartment which houses a 150bhp Brazilian-made Mercedes Benz diesel. The engine drives all six wheels, the front two of which are independently suspended by means of double transverse wishbones and coil springs. The two rear wheels on each side are mounted on a walking-beam which contains a train of driving gears and distributes the load between the wheels. This design helps the vehicle to achieve maximum traction when operating over broken ground. On level road surfaces, the *CTRA* can attain a speed of 60mph and can cover more than 400 miles without refueling.

AMPHIBIAN FOR MARINES

In addition to its very good performance on land, the *CTRA* is also an excellent amphibian. In particular, this applies to the Brazilian Marine version which has two shrouded propellers and two sets of

The author had the opportunity to observe the amphibious *CTRA* during a visit to Sao Paulo. He found the maximum water speed to be 7.5mph and the vehicle to be highly maneuverable.

steering vanes. As a result it has an above average water speed of 7.5mph and is highly maneuverable. Moreover, the *CTRA* is not only fully inclosed but also provided with a set of two air intake pipes on each side of the hull which can be elevated before entering water. As a result, it is not in danger of being swamped by waves washing over the hull and can operate in rough waters, including heavy surf.

Invaluable as they are for the Marines during landing operations from the open seas, some of the features which make the *CTRA* such an excellent amphibian are not cost- or weight-effective in the Army version. For use on land, the *CTRA* need only be able to cross inland waters. Therefore, the Army *CTRA* dispenses with the propellers and the steering vanes. It propels itself in water as well as on land by means of its wheels.

For all its advanced features, the development of *CTRA* has progressed remarkably rapidly since its design started in January 1970. In fact, its prototype was running in July 1970, and in January 1972, Engesa received an order for a preproduction series. Half of the order was for Army vehicles and the other for the Marines.

RECONNAISSANCE ARMORED CAR

In July 1970, the DPET and Engesa began a study on the design of an armored car, based on the same chassis components as the *CTRA*. This led to the *Carro de Reconhecimento sobre Rodas (CRR)*, or wheeled reconnaissance vehicle. Engesa designated the model *EE9* and it has also been called *Cascavel* (rattlesnake).

Although it uses the same suspension, engine and drive system as the *CTRA*, the *CRR* differs in several important respects. These include the location of the engine, which is at the rear, and the fact that it is not amphibious. On the other hand, the *CRR* has a two-man turret which mounts a cannon. This cannon, a 37mm gun of the same type as in the *M8* and *M3A1*, was used to speed up the construction of the prototype. More powerful guns are to be installed in the production models.

Since its completion in November 1970, the prototype of the *CRR* has been subjected to tests in different parts of Brazil and successfully covered more than 40,000 miles. During these tests, the prototype was fitted with novel Brazilian-made bullet-proof tires. These are an important feature of both the *CRR* and *CTRA*. The tires have been developed and manufactured by the Novatracao Company of Sao Paulo and offer several advantages over other types of bullet-proof tires. In particular, they enable a vehicle to operate for a considerable distance at normal highway speed after they have been perforated by bullets. This is particularly important in the case of reconnaissance vehicles which often have to operate far from friendly units and need to return quickly after performing their mission.

Its mobility makes the *CRR*, as well as the *CTRA*, admirably suited to the needs of the Brazilian Armor whose units have to operate over long distances and in a variety of terrain. When it is produced in quantity, the *CRR* should enable the Brazilian Army to dispense with its *M8* armored cars and *M3A1* light tanks. The *CRR* should also significantly improve the capability to perform a variety of surveillance and security missions. Thus, the *CRR*, together with the *CTRA*, will constitute another major step forward in the development of Brazilian Armor.

RICHARD M. OGORKIEWICZ, widely recognized as a leading authority on armored fighting vehicles, is a senior lecturer in mechanical engineering at the Imperial College of Science and Technology in London. He is a frequent contributor to *ARMOR* and has authored *Armoured Forces* and *Development of Fighting Vehicles*.

The Gas Turbine and the Swedish S-Tank

by sven berge

Its close connection with the general concept of the tank and the trade-offs involved in the search for good cost—effectiveness

The potential of the gas turbine as the main power source of military vehicles, particularly main battle tanks, has been discussed often in professional literature over the past 25 years. During this period, a number of test vehicles powered by the gas turbine have actually been built by several countries. But in spite of the striking advantages ascribed to the gas turbine, it has, until now, found use on only one operational main battle tank—the Swedish 43-ton *S-Tank*, officially designated *STRV103*.

In the *S-Tank*, the gas turbine is used in combination with a diesel engine. The turbine develops 490 horsepower, the diesel 240 horsepower, producing a total output of 730 horsepower. In the normal mode of operation, the diesel engine supplies power when the vehicle is stationary or moving at slow speeds. The gas turbine is added when the vehicle moves at higher speeds. However, in the event that the diesel should become inoperative, it is possible to maneuver the tank by the gas turbine alone. Further, the gas turbine is used to start the diesel engine at low-ambient temperatures.

Although tailored exclusively to the *S-Tank*, a slightly modified version of this dual powerplant is

also used on the Swedish self-propelled armored 57-ton automatic 155mm field gun. This gun, produced in a relatively limited quantity in the late 1960s, came into operational use at the same time as the *S-Tank*. The same powerplant was also intended for use on a self-propelled armored twin 40mm antiaircraft gun, the *LVKV42*. However the gun never went beyond the prototype stage. The main contractor for both the *S-Tank* and the two self-propelled guns was the Bofors Company. Volvo was subcontracted for the dual powerplant.

ENGINE DESIGN AND PLACEMENT

The placement of the powerplant in the *S-Tank* is arranged for front wheel drive, with the gas turbine located on the left side of the tank and the diesel on the right. The cooling radiators and fans are housed in two separate armor plated boxes at the rear of the tank, behind the crew compartment. Air intake and filters, as well as exhaust ducts for the two engines, are arranged outside the main armor and are protected by the secondary armor of the sponsons above the tracks. At the rear of the right-hand sponson are two silencers for the diesel exhaust. No silencer is necessary for the gas turbine.

Normally, both engines burn diesel fuel. However, it is possible to run both on either jet engine fuel or low octane gasoline. The *S-Tank* contains three fuel tanks; two 110-gallon tanks housed in the rear of the sponsons, and a 30-gallon tank in the bottom of the engine compartment.

The gas turbine, carrying the make designation *Caterpillar 553*, is of American origin and was built at the jet engine plant of Fabrique Nationale in Liege, Belgium. Its design was based on an engine developed by the Boeing Company for use on the Drone Antisubmarine Helicopter (DASH). In 1968, when Boeing phased out gas turbine activities, the manufacturing rights were acquired by the Caterpillar Tractor Company.

As it had been intended originally for aircraft use, this turbine differs in several respects from the special automotive gas turbines developed in the last decade. First, it is nonregenerative—that is, it does not incorporate any devices to regenerate heat energy from the exhausts. This is a common feature found in automotive gas turbines. Therefore, its specific fuel consumption is much higher than that of the diesel engine—approximately twice as high at full power and about 10 times as high at idle. Second, it is most efficient when operated at a constant speed and under a constant load. Therefore, it does not contain any devices to enhance acceleration and engine braking.

On the other hand, the aircraft-type gas turbine does offer the advantages of a much simpler design, fewer moving parts, much smaller installation volume and an extremely low weight, in this case, about 450 pounds. Because of its origin as a helicopter engine, it does share one important feature with the special automotive gas turbine—twin shaft arrangement with the compressor impeller and compressor turbine on one shaft, and the free power turbine on the next shaft. This configuration gives an automatic, aerodynamic, torque multiplication of the same kind as the hydrodynamic one of the torque converters in automatic transmissions for piston engines.

Like the gas turbine, the diesel engine is also a compact piece of machinery. It is, in fact, one of the most compact of its time. When chosen as a component in the *S-Tank* program it was under development at Rolls Royce for use in British vehicles such as armored personnel carriers and self-propelled field guns. It is a 6-cylinder liquid-cooled opposed-piston 2-stroke multifuel engine with a swept volume of 6.1 liters.

The diesel engine, designated *K60*, used in the *S-Tank* differs from the British engine in that it has a power take-off coupled to the hydraulic system. This makes it possible to use, when necessary, all the power of the diesel to aim the armament of the tank.

For propulsion of the tank, the output shaft of the diesel is coupled to an automatic transmission, Volvo *DRH1M*—a three-speed transmission including a hydrodynamic torque converter. Thus, the power unit, consisting of the diesel and this automatic transmission, has output torque characteristics similar to those of the twin shaft gas turbine. It has, therefore, been easy to arrange a common output of the two engines over a mechanical combining gear, including a planetary gear box with two speed ranges—the maximum being 37 miles per hour and 11 miles per hour respectively, both in forward and reverse.

Both engines are connected to the combining gear with individual interlockable free-wheels. In normal operation, the free-wheel of the gas turbine is kept open, so that the gas turbine power can be cut in and out smoothly in response to maneuvering requirements. The free-wheel of the diesel engine is normally locked to make use of the braking capacity of the engine. Locking of this free-wheel is also required for starting the diesel with the gas turbine engine.

The power output of both engines is controlled by one accelerator pedal linked to the engines via a mechanical coordinating system. For starting and shutting-down, there are, of course, separate controls.

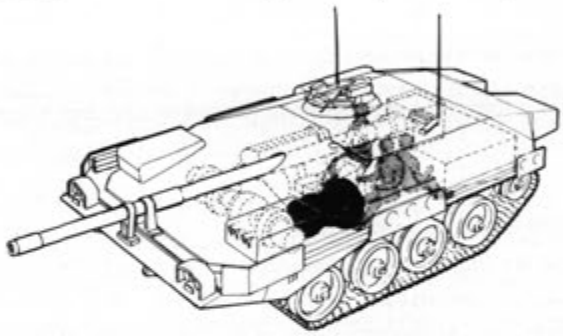
DESIGN PHILOSOPHY

The background of choosing this dual powerplant concept is closely connected with the military requirements that led to the development of the *S-Tank*. In turn, these requirements were the result of a series of basic studies carried out in the mid-1950s. They clearly showed that tanks would be an indispensable element of the Swedish Defense for the foreseeable future, especially for the defense of the open areas in the south and along the coast of the Baltic Sea.

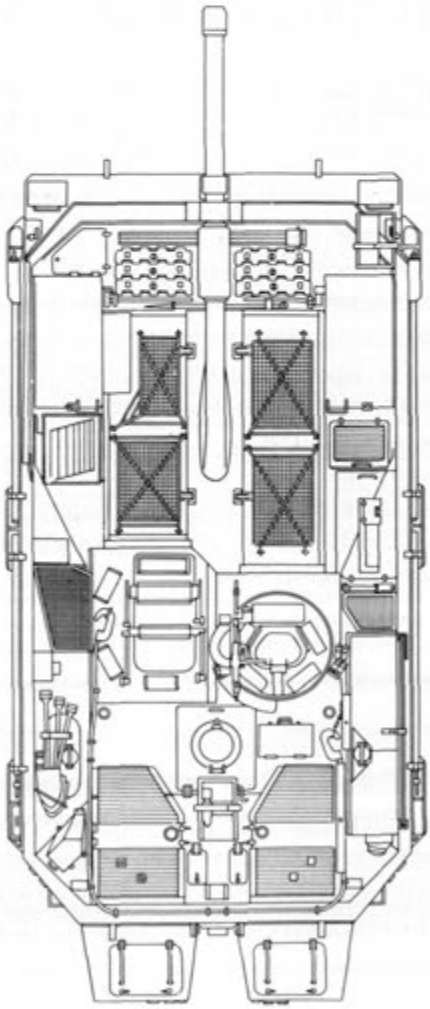
However, these studies made it equally clear that the particular defense of Sweden—taking into account her small population of 8.1 million in relation to her large land area of 175,000 square miles and the 1,000-mile distance between north and south; her numerous water obstacles in the form of over 95,000 lakes; her conscript service system with a short training time—called for efforts to find a new tank concept more suitable than that of conventional battle tanks.

As these studies were in progress, the Swedish Armor Corps was being equipped with the British 57-ton *Centurion* tank. And Sweden shared the opinion of many other countries that this tank probably was the best of its time. In fact, its up-gunned version is still in service and will remain so for many years to come.

Nevertheless, the studies made it evident that the next tank, in order to suit the special conditions of Sweden, had to be superior to tanks like the *Centurion*, in the sense that good firepower and protection had to be combined with a lower vehicle weight and simpler training procedures. For strategic and tactical mobility, the maximum vehicle weight was set at 43 tons, and if possible, the tank should have an inherent swimming capability. These contradicting requirements were further aggravated by the fact that the properties of more effective armor protection had to be incorporated because of new antitank weapons based on the shaped charge principle.

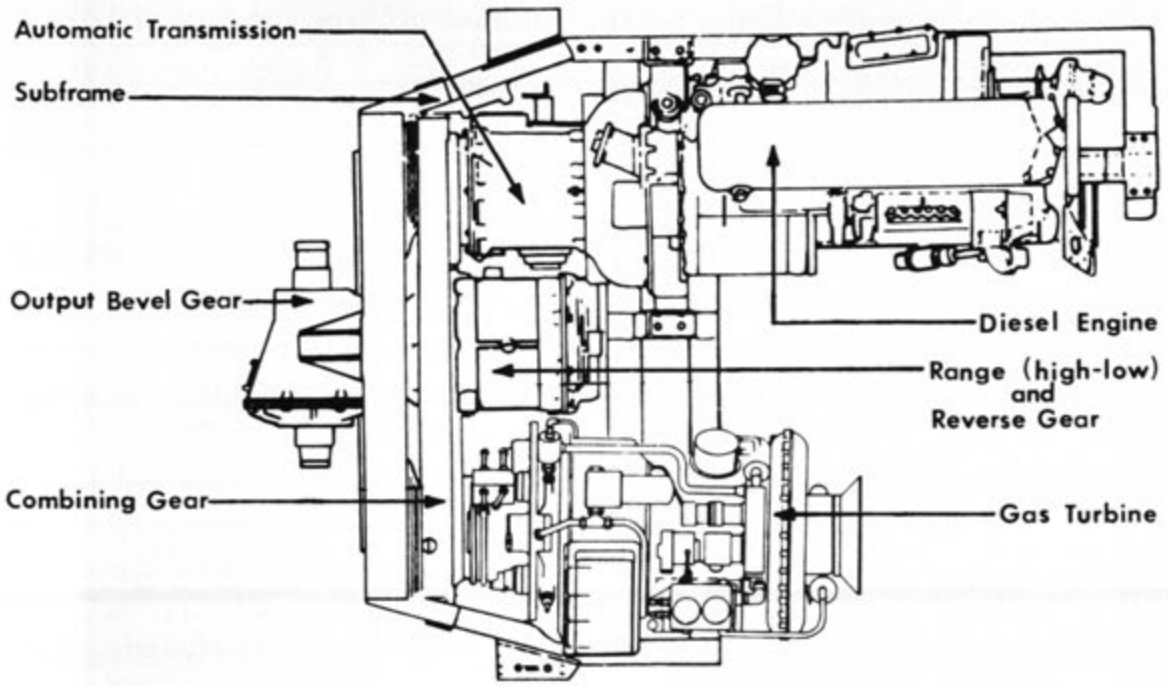


The three-man crew of the *S-Tank* is located on one level rather than the two-tier arrangement found in the design of other conventional tanks. This helps reduce tank size and also greatly simplifies training.



It was easy to conclude that the only chance to fulfill these requirements would be to bring the necessary components of armament, ammunition, propulsion machinery and crew together in a more compact way than ever before. It was established that the most rewarding departures from common design principles would lie in two areas that, more than anything else, determine the size and volume of conventional tanks.

In the design of the conventional tank, the manual



loader needs an almost upright position to do his heavy work; and a two-tier arrangement is needed for the crew—the driver sitting in a separate compartment down in the hull front while the rest of the crew is located in the rotating turret. Elimination of these two design concepts would both reduce tank size and also greatly simplify crew training.

These considerations led to the *S-Tank* concept. The main armament and coaxial machine guns are mounted fixed in the hull and aimed both in traverse and elevation together with the hull—in much the same way as tube weapons of fighter aircraft. Aiming in traverse is done by means of ordinary hydrostatic steering of the tank. Aiming in elevation is accomplished by pumping oil from the hydropneumatic roadwheel springs in the front to the rear, or vice-versa.

This concept allows for a relatively simple automatic loader for the main armament—a 105mm high-pressure gun 62 calibers in length. The loader mechanism is integrated with two ammunition magazines located at the rear, behind the crew compartment and underneath the armored boxes of the cooling system. The gun breech and recoil mechanism are on top of the magazines, between the two cooling system boxes.

With this arrangement, which was found to give the best location for ballistic protection and refilling of the ammunition magazines, the minimum height of the tank could be determined exactly by the required number of rounds. In turn, the minimum height of 1.9 meters established in this way, coincided with the comfort requirements for a sitting crew.

POWERPLANT SELECTION

All of the factors involved in the design philosophy of the *S-Tank* were of great importance when examining the different powerplants available for the vehicle. Experience gained in combat and cost-effectiveness calculations had indicated that it would be of great value to maintain the minimum silhouette height just described. In consequence, it was of particular interest to try to arrange a powerplant that would not require a higher vehicle hull.

Other factors involved in the configuration of the powerplant were the frontal armor slope, the gun tube space in the mid-top portion of the engine compartment, and the space at both sides of the gun breech, where the most favorable location of cooling radiators and fans appeared to be.

In order to provide good frontal armor protection, in conjunction with adequate vision for driving and close-in combat, the upper frontal armor should preferably have a constant slope of 78 degrees from the forward edge to the crew compartment. The lower frontal armor, for reasons of protection and mobility, should have a slope of about 73 degrees. This, and the needed gun tube space, left a desired engine compartment configuration with rather hard restrictions as to the available height in the frontal part and underneath the gun.

By nature, most of the surface of the cooling sys-

tem is made from thin sheet metal. Penetration by a projectile, shaped charge jet or a shell fragment of this vulnerable area could cause a rapid loss of coolant or lubrication oil, immobilizing the vehicle within minutes. Therefore, it was highly desirable to find a powerplant that did not require more cooling system space than what was available in the well-protected area behind the crew compartment and inside the main side armor. Additional side protection of these areas was offered from the large fuel tanks arranged outside the main armor, under the secondary armor of the sponsons.

The space under the frontal secondary armor of the sponsons was considered acceptable for air filters, air intake and exhaust ducting. Although this location of air filters would mean a greater risk of projectile penetration, such damages would not prevent the vehicle from carrying out an immediate mission and continue running for some hours before repairs were necessary.

ENGINE DEVELOPMENT

Development of the dual powerplant was begun in the fall of 1959. From a world-wide survey of available engines, 12 alternatives were chosen for the preliminary analysis. By that time, feasibility tests had confirmed the *S-Tank's* gun-laying principle was viable, and the desired dimensional restrictions were fairly well defined.

The team assigned to examine the different alternatives was rather surprised to find that the dual powerplant, incorporating a nonregenerative gas turbine and a diesel engine, was much superior to the other alternatives, when looked upon in the total cost-effectiveness perspective.

First, this dual powerplant was, in fact, the only alternative that would fit into the desired hull configuration. All other alternatives would require substantial concessions in vehicle silhouette and ballistic protection over the frontal area.

① Gas turbine air cleaner; ② Cooling air inlet; ③ Diesel engine silencer.

① Diesel engine combustion air inlet; ② Gas turbine air inlet; ③ Gas turbine exhaust.

With the gas turbine and the diesel engine on either side of the gun tube, the dual powerplant gave the advantage over other alternatives of easier access for normal maintenance. Furthermore, this two-engine arrangement—both individually capable of moving the tank (although with some restrictions)—offered an added amount of assurance in regard to battlefield availability.

The engine combination also appeared to have more growth potential—a factor much sought after in the design of any combat vehicle. In this particular case, it was seen as an opportunity to utilize many of the yet-undeveloped innovations within the gas turbine and diesel engine field.

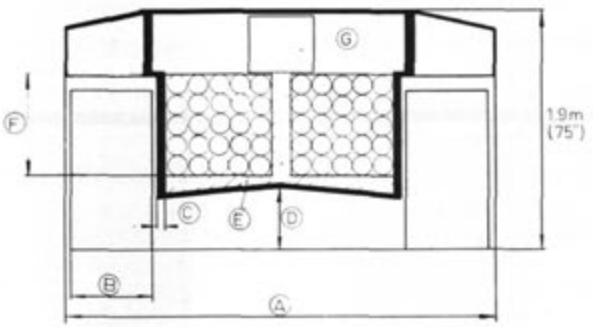
The actual development was based on a total power requirement of about 500 horsepower. From the beginning of the program, the 240-horsepower Rolls Royce *K60* engine was selected. The gas turbine engine first selected was the 270-horsepower Boeing *502*, which was the only proven twin-shift turbine available at that time. After a few years of development, it became evident that more total power was needed in order to keep pace with other contemporary tank developments.

Therefore, the team began a study of different methods to increase the combined horsepower. By the use of turbochargers and an intercooler for the combustion air, the output of the diesel could be increased to 300 horsepower. However, this would also necessitate an increase in cooling requirements, thereby reducing the possibility of good ballistic protection. A more attractive way seemed to be with an improved gas turbine.

It was found that the output of the Boeing *502* gas turbine could be increased to 330 horsepower without any adverse effects on the rest of the tank. However, Boeing proposed to deliver an improved

turbine, the *553*, which it had recently developed. Occupying the same amount of space as the *502*, this new turbine developed a maximum power of 490 horsepower while cutting the specific fuel consumption by about 20 per cent. The new turbine did require the reinforcement of certain vital parts of the transmission, but test results proved positive and it was decided to change to the more modern engine after one year of production of the *Mark A S-Tank*. These first production tanks would later be refitted with the more powerful turbine.

While early appraisal of the dual powerplant proved it to be superior to the other alternatives in total cost-effectiveness, it was realized that this system did have some shortcomings. Two obvious problems were fuel consumption and slow acceleration.



Factors Affecting Minimum Height

(A) Railway gauge 3.4 meters; (B) Track width for required nominal ground pressure not exceeding 13 pounds per square inch; (C) Required side armor; (D) Required center ground clearance 0.5 meters; (E) Space needed for automatic loader; (F) Height of magazine for required 50 rounds (2 x 25); (G) Best location of gun breech for automatic loading.

On an average, it was calculated that fuel consumption of the dual powerplant would be equal to a spark ignition gasoline engine with automatic transmission. As compared to a single diesel powerplant, it would be twice as high. With an estimated fuel volume of about 250 gallons, this would mean the cruising range of the *S-Tank* would be 150-200 miles running on both engines. Although this range would be greater than that of the *Centurion*, it would be much less than that of modern single diesel-engined tanks.

This disadvantage, however, was seen as an acceptable trade-off. The rationale was: "Better to have tanks combining this fuel consumption and range with a low silhouette and good ballistic protection than have tanks superior in fuel economy but inferior in the probability of survival on the battlefield."

The second shortcoming of the gas turbine—slow acceleration characteristics—would in most cases, it was felt, be well compensated for by the quick responsiveness of the diesel engine. Further, a special driving technique could be applied to overcome this disadvantage.

FIELD EXPERIENCE

User experiences with the dual powerplant have, in general, verified the initial considerations and calculations made in the design of the *S-Tank*. In certain areas, the amount of development work and subsequent modifications have, however, been greater than what was foreseeable when the project was first begun. In particular, this has been the case regarding the means to protect the gas turbine against failures due to dust ingestion.

According to early test experiences, the gas turbine would be adequately protected by an air cleaner of the inertial separator type which contains a number of cyclone tubes and a scavenging fan. However, it later became evident that much more filtration was needed to obtain long service intervals and an acceptable turbine life. This was found to be especially true in peacetime operations such as driving in convoys over armor regiment training fields where there often is a high percentage of dust particles in the air.

Based on these experiences, the air cleaner system has been redesigned to include a barrier-type panel filter after the inertial cleaner. In addition, the sensitive aluminum surfaces of the compressor impeller and the diffusor have been coated with a harder material.

Experience in the field has led to a special driving technique to cope with the slow acceleration of the gas turbine. It was found that the driver must plan in advance when using the accelerator. On approaching an obstacle which will require more power, he must depress the accelerator pedal much sooner than normally expected. Because of this, he may have to control the vehicle speed in negotiating particularly difficult obstacles by using the brake pedal and the accelerator pedal simultaneously. However, these

driving techniques have been found to be quickly mastered by the conscript drivers.

It must be noted that these techniques do not apply to surprise situations. In such cases, the reaction time of the dual powerplant—particularly if the tank is stationary—is longer than that of a single piston powerplant. However, during tactical tests where *S-Tanks* were compared with modern conventional tanks powered by single diesel engines, this obvious disadvantage rarely presented itself. And in practice, the disadvantage of slow response was usually overruled by the advantages of the crew arrangement in the tank. The commander and the combined gunner-driver both have an excellent vantage point from atop the tank. This prevents many surprise situations, and as the commander is provided with overriding shooting and driving controls, there is no delay caused by issuing orders to other crew members.

A large number of tests have been carried out to verify the ballistic protection—which to an important degree can be attributed to the small volume and weight of the gas turbine. About 250 tests have been made with tank guns, antitank weapons, mines, napalm bombs, artillery shells and nuclear shock wave simulators. In all tests both engines were running. The results have shown that the immunity of the tank meets initial requirements and is substantially higher than that of conventional tanks in the same weight class.

One of the 250 ballistic protection tests conducted on the *S-Tank*.

Regarding the key factor of costs, the *S-Tank* stayed on approximately the same level as other new main battle tanks developed in the late 1960s. Total developmental costs, including 12 prototype vehicles, were close to 30 million dollars. The powerplant itself made up one third of the cost. While the manufacturing costs have been a bit higher than those of contemporary tanks built in larger numbers, they are, it seems, somewhat lower than the costs for tanks built in approximately the same quantity.

IN RETROSPECT

In the course of the development and use of the *S-Tank*, several reviews have been made to determine whether any other kind of powerplant would have been more efficient. The latest review, made two years ago and with more data available than ever before on powerplants, indicated, like the previous tests, that from total cost-effectiveness the dual powerplant fitted the *S-Tank* better than other sources of power available.

SVEN BERGE, chief engineer of the Army Mobility Directorate of the Swedish Defense Materiel Administration, was largely responsible for the concept of the *S-Tank*. After serving with the Swedish Armor Corps in the first years of World War II, he has been engaged in development and production of combat vehicles for the past three decades and is a former president of the Swedish Society for Military Technology.

THE FIRST IMPRESSION

By Captain James R. Gardner

For a new company commander, no impressions are as lasting or as meaningful as those first given his men. Upon these initial perceptions are based the relationships that will either insure or doom the success of his command. Yet, too often, through haste or neglect, the importance of this first encounter is ignored. To do so is to betray the needs of soldiers and the responsibilities of the position of command.

For the men of the unit, their first impressions of the commander are crucial. Each man assembles bearing expectations that will be either reinforced or destroyed by what he sees and hears. If he departs confident in his new commander's competence and concern, he will be receptive to all that follows. If his reaction is one of antagonism, rejection, or distrust, morale is shattered. From experience, each man realizes well how much his welfare and the will of his commander are intermeshed.

The commander, therefore, must approach this initial meeting with thoughtful and deliberate preparation. The image and tone to be projected should be defined, consistent with the setting and the unit. The techniques of delivery should be designed to highlight his competence and stage presence. His comments should reflect mutual respect, concern for his subordinates and a thorough familiarity with the unit and its members. Any announced policies should be consistent and fair. Throughout, unity, mutual dependence and team work must be fostered. Such qualities are not achieved by indifferent preparation. Instead, they stem from a systematic study of the unit and from knowledge of its personality.

For example, within all companies informal nets of communication and influence exist. Often, such systems may be more effective than formal channels. While the new commander cannot directly address or acknowledge these informal patterns, an awareness of them will give him greater empathy and sensitivity.

Though often not exploited, sources for this type of advance information are readily available. Even the most thorough briefing by a battalion commander may suffer from omissions that precise questions can remedy. Battalion staff members are usually quite willing to indicate specific problem areas. If possible, the comments of the departing commander should be sought and judiciously considered. Reviews of the unit's personnel data cards, judicial records and administrative files will reveal information of both immediate and long-term use.

Armed with this knowledge, the new commander should then complete the final and most agonizing appraisal—that of himself. His initially projected image must be authentic. It must be one that can be sustained without contradiction or inconsistency. Nothing should be promised or implied that cannot be given. Bravado and theatrics should not masquerade as confidence and professionalism.

The actual techniques of presentation are functions of the situation and the commander's personality. One young captain, a natural athlete freshly toned by Ranger School, assumed command of his Berlin Brigade infantry company during morning calisthenics. After his remarks to the men gathered around the stand, he led them on a run that indelibly marked the day in the minds of all. Another captain, by studying the personnel files, memorized the names and hometowns of all the men in his unit. Casually,

yet expertly, integrated into his initial remarks, this display of intelligence and concern cemented his grip upon the company.

Each of these approaches was different. Each was successful. And each, by this success, reflected the commander's understanding of himself and his unit.

To identify the exact components of the ideal introduction would be impossible. However, it is possible to isolate those broad themes which have characterized many effective initial impressions.

Every unit has strengths and weaknesses, triumphs and failures. In any initial comments, sensitive or controversial topics should be by-passed; there is much gained and little lost by timely and selective silence. No former leader should be maligned. Nor should any past unit failures be recalled, since few men appreciate a self-proclaimed messiah. Past group successes should be praised. The positive must be accentuated as a basis for pride and for further achievement together.

All soldiers, whether draftees or careerists, view their relationship with the Army as one of mutual obligations. Nothing demoralizes a man more than believing that the Army has failed to fulfill its obligations to him. Whether it be good food in the mess hall, accurately computed pay, or responsive medical care for his dependents, all that is owed the soldier must be his. Because of this, the new commander must stress in word and in subsequent action the fulfillment of this implied contract.

In his initial comments, the commander must demonstrate a knowledge of the unit and its personnel. This may take the form of anecdotes or it may be simply a disguised recitation of obscure details. Yet, regardless of its form, its inclusion is vital. Soldiers need and respond to the concern shown them as individuals.

Each man must sense his individual importance to the company and to its mission. Lacking such a feeling, the soldier tends to react rather than plan, and to him, the operations of the unit appear disordered and hastily conceived. Because of this, the commander must strive from the onset to keep all members of the unit informed.

Any urges felt by the commander to institute immediate changes should be surpressed until he has demonstrated his willingness to listen. The accessibility of the commander should be emphasized, and announcement made of "open door" opportunities. Through listening, the commander will not only gain insights into the personality of his company, but he will also lay the basis for continued feedback.

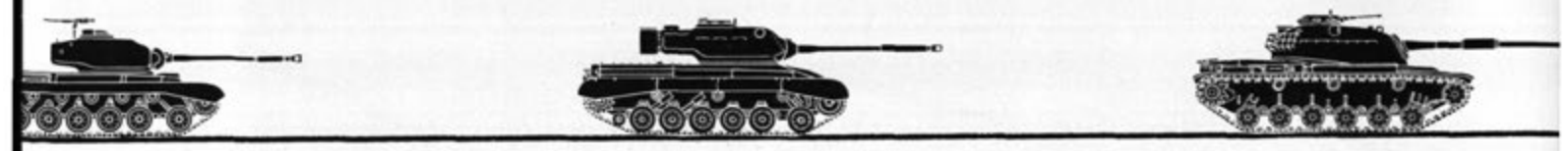
While avoiding any rash overcommitment, the new commander must establish his authority immediately. He may choose, for example, to interview every man on the current promotion lists, thus establishing himself as the source of unit rewards. He may elect to review all current punishments, and perhaps, to exercise his prerogatives under the Uniform Code of Military Justice to suspend, remit or restore. But whatever the device selected, it must reinforce his authority and firmly establish his command privileges.

The commander must reaffirm his belief in integrity, honor and duty. His expressed commitment to high principles of professional and personal conduct will reinforce his stature as a leader to be both respected and obeyed.

As a final point, a preview of his thoughts should be given to the company officers and the first sergeant. As subordinate leaders on the company team, they should receive, from the beginning, the confidence and trust of the commander.

To some men, these characteristics are matters of instinct. To others, they are principles to be studied and retained. But to all, they are the essence of the first impression.

CAPTAIN JAMES R. GARDNER graduated from the US Military Academy in 1966 and holds a master's degree in public affairs from Princeton University. He served with the 196th Infantry Brigade in Vietnam as a company commander, battalion S2 and battalion S3. After attending the Armor Officer Advanced Course, he was assigned as aide-de-camp to the commanding general of the Military District of Washington.



PROGRESS THROUGH EVOLUTION

By Charles B. Salter

Over the past several issues, *ARMOR* has provided a forum for many opinions on the future of the US Army Tank Program. These opinions range from the nihilistic suggestions of Lieutenant Colonel Warren W. Lennon in "The Death of the Tank" (January-February 1972), to the phoenix desire of General James H. Polk to resurrect the *XM803* in "We Need a New Tank" (July-August 1972), to the shoot and scoot *Sheridan*-like suggestions of Captain Timothy R. O'Neill for a lightweight relatively unarmored vehicle in his article, "Advanced Main Battle Tank" (November-December 1972).

Likewise, the subject of a new tank has received much attention at various elements in the Department of the Army, Office of the Secretary of Defense, and Congress. All these discussions seem to evolve around the general consensus that a new tank is required, but the point of disagreement is—"How do we get there within the resources currently at our disposal?"

It is interesting to note that in these discussions there is general agreement that the *M60A1* is a good, reliable tank which currently meets the needs of the user. The problem exists in projecting its usage into the future, along with the fear, quite justified, that if progress is not made our tanks will not be competitive with future potential threats.

The history of tank development in this country as well as other countries, makes it quite apparent that major problems are encountered when an attempt is made to design a tank from square one. The British *Chieftain*, which is the newest tank to be fielded, is in its fifth modification and has been in design and redesign for many years. The American MBT went through several iterations and even changed its name from the *MBT70* to the *XM803* in an effort to distinguish between early configurations and proposed production models. Although not considered a tank, the *Sheridan M551* also suffered from the same malady. Early pilots required redesign in practically every area from the cupola to the track shoes before it could successfully enter Engineering and Service Test. From this background, it is easy to predict, with a high degree of certainty, that all new tank designs starting from square one are destined to have problems.

It is almost axiomatic that before new systems are fielded, development costs sky rocket, schedules slip, many modifications are introduced and an unsatisfied user is unhappy since the end product often does not meet his expectations. To complicate the matter even further, once a new system is fielded, major problems generally occur in training and logistical support, and operational availability is nowhere near what was originally predicted. Although this article is directed toward the Army and tanks, similar parallels can be drawn from the other sister services.

In order to overcome these problems, DA has released a new regulation, AR 1000-1, which sets guidelines for the acquisition of new materiel. These guidelines set patterns for establishment of requirements, competition in design and development, "design to" cost in procurement, and new procedures for testing and evaluation. All this is to be accom-

M26

M46

M47

plished within six years—a much shorter time than allowed for previous programs. Although these desired goals are commendable, they are in direct conflict with the real world of major weapon system acquisition. If the *M60A1* is a good and reliable tank, well accepted by the user, that can be supported with a high degree of operational availability at a relatively low cost, it appears prudent then that we examine the approach that is now being used in the new acquisition process.

As is well known, the *M60A1* tank was not designed from scratch, but is essentially a product improvement of the *M60* tank which in turn evolved from the *M26* through the *M46*, *M47* and *M48* tanks.

This progress through evolution apparently is the procedure used by the Soviet Union in developing new weapon systems. Each new model tank is primarily a product improvement of the previous model; just as the *M60A1* bears no resemblance in performance or capability to the *M26* or *M46*, likewise the current Soviet *T62* is a far cry from the early *T34* or *T54*.

The use of evolution carries with it many significant advantages. First, the probability of success is high; second, the impact on the user in the area of training and logistical support is minimal; and third, the cost is generally reasonable. If this is possibly the best way to obtain a new tank, it is worthwhile to look at the old procedures that were employed to achieve results.

QMR VERSUS MATERIEL NEED

The requirements for the *M60A1* and previous tanks were established by Qualitative Materiel Requirements (QMR). These QMRs were not very specific and omitted detailed design requirements in the areas of reliability, maintainability and hit performance. However, this lack of detailed specifics provided the developer maximum flexibility in design.

The Materiel Need Document (MN), which is currently employed, is entirely too restrictive. The rather detailed designation of values for such things as reliability, hit performance, ballistic protection, logistical support and cost found in materiel needs documents restrict the developer to such a degree that often a brand new design is required rather than one based on product improvement. It can be argued that MN guidelines from the user are required in order for the developer to progress. However, once the user sits down to establish these guidelines, his desire for improvement in every area leaves the developer no choice but to redesign equipment from the beginning. Once again we are back to square one.

DESIGN AND DEVELOPMENT

Probably the biggest mistake is the desire to design and develop new hardware on a competitive basis. In the development evolution of the *M60A1* tank, a considerable fund of knowledge in tank design has been accumulated. This knowledge currently resides with the original developer, and since tank design is not a subject taught in universities, nor is there an appropriate industrial counterpart, tank design teams are hard to come by.

When a design competition is employed for a new development often a new prime contractor is selected.

M60

M48

This new contractor must now develop his own expertise by the trial and error method. Eventually, a new design team capable of designing and developing a new tank must evolve. This is a costly and time consuming process. Of even greater significance is the fact that we put together design teams at various contractors, pay for their education, and then abandon them for a new contractor when, in most cases, they are most efficient. The teams that designed the *Sheridan* and the *XM803* reached a peak of competency just as the programs were terminated. The team that has designed the *M60A1* continues to improve, but would be abandoned if another contractor is selected to design a new tank.

TESTING

Since hardware often reaches the field with many problems undiscovered until in the hands of troops, considerable attention is now being placed on improved and increased testing. This testing is to be conducted under the auspices of the user, and is intended to reflect actual field conditions.

Unfortunately, this additional testing will not solve the problem. In all cases, the hardware that is tested reflects early design configurations or initial production. Test programs that must evaluate complete weapon systems are, by necessity, complex and interdependent. The system testing planned by the user on small quantities of tanks will show up glaring design deficiencies, but will be inadequate to completely wring out thousands of new designs which are incorporated into a completely new system.

Under a system of evolution, testing can be directed only to the new item and total system testing is required. Thus, not only is time and cost of testing greatly reduced, but the testing will be more meaningful and thorough since it will fully evaluate one major component instead of many interdependent components and a total end item system. This reduces risks and assures maximum probability of a fully-tested item successfully reaching the field.

PROCUREMENT

The major advantage of evolution is in the procurement cycle. Since, under the evolutionary process, production lines and major vendors are not disturbed, it is possible to improve quality, take advantage of learning, and improve reliability of the basic weapon system at the same time that the new product improved item is being introduced. As an example, if a totally new tank is introduced, it becomes necessary to shut down the existing production line or establish a new production line. Either alternative is quite costly.

Once vendors have been shut off, it is often difficult to reactivate them, since skilled workmen will be transferred to other jobs and will not be available for production of the new tank. Even designs that are mature and have been previously produced encounter major problems when new vendors and producers get into the act. The records are full of examples of major schedule slips, cost overruns and technical problems when new vendors or contractors try to produce hardware that was successfully produced by a different vendor or contractor.

M60A1

M60A2

M60AIE3 (M60A3)

M551 Production Version

LOGISTICAL SUPPORT

Logistical support is the greatest problem in the field. With the introduction of the new weapon system, corollary problems will be encountered in filling the supply system, developing adequate manuals and training personnel for operation and maintenance.

Personnel trained in operating and maintaining the *M60* tank can operate and maintain the *M60A1* or the *M48A3* tanks without many additional problems. The major quantity of components in the supply system are common to all three. To a large extent, the same manuals can be used for the common items.

The field will readily accept a new piece of hardware if it can be shown that it will increase capability and at the same time can be easily maintained with a high degree of readiness. Even a sophisticated piece of new hardware, such as the add-on stabilization system going into the *M60A1*, will not cause major problems since additional training and support will be minimal.

However, when a new weapon system is introduced, considerable education and training is required in order to maintain its operational readiness. If this is compounded by technical problems requiring modification kits and shortages in the supply system, the new system, no matter how good, will acquire a poor reputation and user field acceptance will be a long time in coming.

COST

Finally, and probably the most important consideration in favor of evolution, is cost. A new tank must pay the cost of developing new vendors, procuring new tooling and establishing new production lines. These costs are far greater than the costs of the hardware it is replacing, and often cannot be justified on a cost-effective basis. After all, it was the projected price of the *XM803*, rather than the technical problems, which led to the decision to terminate the program.

EVOLUTION OR REVOLUTION

Over and above these considerations is the capability of modernizing the fleet. When a tank is improved by evolution, it is always possible to add the product improvements by retrofit. In Colonel Stan R. Sheridan's article, "The Future Is Now" (July-August 1972), he pointed out that the product improvements being developed now for the *M60A1* are capable of being introduced in previously procured *M60* and *M60A1* tanks. This assures us that the fleet will be modern, can be maintained, and will be available when required.

Therefore, if the US Army requires a new tank, why not develop it using the same development and procurement procedures that were so successful in introducing the *M60A1* tank into the fleet?

That is, by evolution, not revolution.

CHARLES B. SALTER has a master's degree in engineering from the Michigan Technological Institute and has been employed by the US Army Tank-Automotive Command since 1952. He is presently the Deputy Project Manager for *M60* Tanks.

COMPUTE OR PRECOMPUTE:

TAKE YOUR CHOICE!

Battalion Commander to his S3: *We have to move Teams A and B, and the CP tonight to the new assembly areas. Order of march will be Team A, the CP and Team B. We will move at 15mph with 25 meters interval. I want a 5-minute time gap between march units. Our SP time is 2200 hours. Whip up a movement order and get it out to all concerned ASAP.*

If you were the S3 in this situation, how long would it take you to complete the movement order? Thirty minutes? One hour?

Before discussing how to do it, let us review the information you need. The two most important factors you must know are time-distance and pass time.

- Time-Distance (TDIS) is the time it takes an element to move from one point to another at a given rate of march.
- Pass Time (PST) is the time required (expressed in minutes) for a march element to pass a given point. Some older manuals refer to this as time length.

In order to compute PST, you must know the Length-of-Column (LGTHCOLM). LGTHCOLM is the amount of road way (expressed in kilometers) occupied by a march element. Some manuals refer to this as road space. Although LGTHCOLM is needed primarily to compute PST, LGTHCOLM may be needed for other purposes. For example, if a column must halt for an extended period during its move, the amount of road space tied up may be critical.

There are several ways to develop your movement order. The first is to pull out your trusty FMs which you carry religiously. If you do not have your references, and you cannot recall the formulas, you really have a problem and will have to come up with some hasty estimates. If you do have your references, you can develop your movement order by using the following formulas:

$$\text{TDIS (Expressed in hours)} = \frac{\text{Distance}}{\text{Rate}}$$

or

$$\text{TDIS (Expressed in minutes)} = \frac{\text{Distance} \times 60}{\text{Rate}}$$

$$\text{LGTHCOLM} = \frac{\text{Number of Vehicles}}{\text{Density (Vehicles per kilometer)}}$$

$$\text{PST} = \frac{\text{LGTHCOLM} \times 60}{\text{Rate}}$$

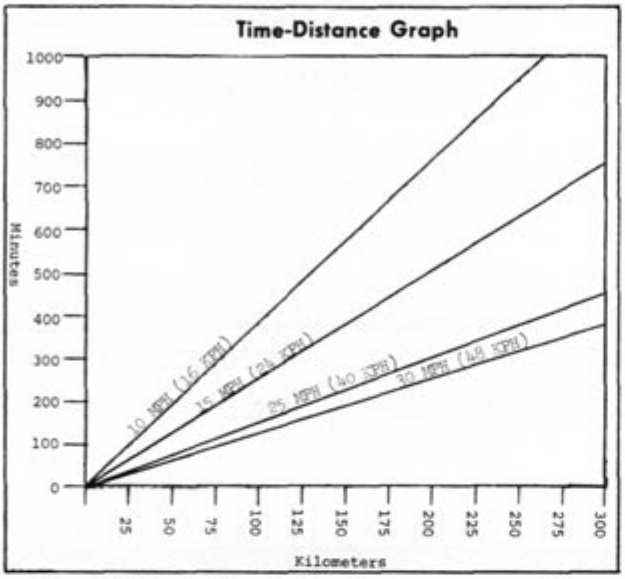
These formulas will permit you to easily compute the TDIS between each critical point and the PST for each march unit, and are particularly useful when you are pushed for time.

A second method is to precompute the march data and arrange it in some format that will faciliate its use when needed. A good time to do this is before you go to the field again. There are several manuals

BY MAJOR EDWARD D. HART

which contain examples of precomputed march data. The following recommendations are provided for consideration and evaluation as planning aids at battalion level, because they minimize the requirement for mathmetical computations.

TIME-DISTANCE GRAPH



One aid for TDIS problems is to construct a Time-Distance Graph. Construct the graph so that it will show the standard rates of march prescribed by your unit SOP. The TDIS for a given distance and a given rate of march can be quickly read from this graph with no computations whatsoever. The graph can be reproduced on a 5x8 card for pocket use or S3s may desire to construct it on standard notebook size graph paper which will allow them to use a smaller and more precise scale. Both miles per hour and kilometers per hour are indicated. Although we are measuring our distances in kilometers, our vehicles still have speedometers graduated in miles per hour.

TIME-DISTANCE TABLE

TIME-DISTANCE TABLE (Minutes)	Rate of March				
	MPH	10	15	25	30
	KPH	16	24	40	48
Minutes to go 1 kilometer		3.75	2.5	1.5	1.25

Another aid for TDIS problems is to construct a Time-Distance Table. This type of table provides the TDIS for 1 kilometer for each of the standard rates of march prescribed by the SOP. The TDIS for any given distance and rate of march can be quickly computed by multiplying the distance by the factor for 1 kilometer. This table is more precise than the Time-Distance graph; however, it does require a mathematical computation by the user.

LENGTH-OF-COLUMN AND PASS TIME TABLE

As with TDIS, there are several aids for LGTHCOLM and PST problems. One is to compute the LGTHCOLM and the PST for selected numbers of vehicles moving at various standard rates and intervals, and then arrange this data in a table. This en-

LENGTH-OF-COLUMN AND PASS TIME TABLE

MARCH UNIT	NUMBER OF VEHICLES	LGTHCOLM (Kilometers)			PASS TIME (Minutes)					
		INTERVAL			10MPH 16KPH			30MPH 48KPH		
		25M	50M	100M	25M	50M	100M	25M	50M	100M
Battalion CP	21	.7	1.2	2.2	3	5	8	1	2	3
Combat Trains	20	.7	1.2	2.1	3	5	8	1	2	3
Field Trains	30	1.0	1.8	3.2	4	7	12	1	2	4
Support Company (-)	28	1.0	1.6	3.0	4	6	11	1	2	4
Tank Company (1)	26	.9	1.5	2.8	3	6	11	1	2	4
Mech Inf Company (2)	25	.9	1.5	2.7	3	6	10	1	2	3
Tank Heavy Team (3)	25	.9	1.5	2.7	3	6	10	1	2	3
Mech Heavy Team (4)	26	.9	1.5	2.8	3	6	11	1	2	4

Notes: 1. Pure tank company, minus those elements located in the battalion field trains area, and plus a front line ambulance and medical APC.
2. Pure mech. infantry company with same detachments cnd attachments as above.
3. Tank company minus 1 platoon, plus 1 mech. infantry platoon and the other attachments and detachments shown above.
4. Mech. infantry company minus 1 platoon, plus 1 tank platoon and the other attachments and detachments shown above.

ANNEX A (ROAD MOVEMENT TABLE) to OPORD 15--2-11 Armor
Reference: Map, Series M508 GERMANY, Sheet M50 (NURNBERG). Edition 2-AMS, 1:250,000.
Time Zone Used Throughout the Order: ALFA.

GENERAL DATA

1. Average speed: 35 kmph.
2. Traffic density: 15 veh per km.
3. Halts: 15 min after first 60 min; 10 min after each 110 min.
4. Routes: annex B, Strip Map.
5. Critical points:
   a. SP's: (see colm f).
   b. RP's: (see colm g).
   c. Other critical points: (see colm j).
6. Main routes to SP's: (see colm i).
7. Main routes from RP's: (see colm m).

March Unit Number	Date	Unit	No. of Veh	Load Cl of Heav-iest Veh	From	To	Route	Route to SP	Critical Points Ref	Due (Hr)	Clear (Hr) (EXTAL)	Route from RP	Remarks
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)
Qtr pty	5 Jul	S1	1	14	PV238649	PA908210	Annex B, Strip Map	Trail south to Hwy 14 to SP					Move by infiltration
		Comm Plt	1										
		HHC, XO	1										
		Spt Co, XO	1										
		Co A	1										
		Co B	1										
		Co C	1										
		C/2-92 Mech	1										
		Cl III trk	1										
		Aid/evac veh	1										
			10										
2	5 Jul	Co B	26	55	PV238649	PA908210	Annex B, Strip Map	Trail south to Hwy 14 to SP	SP	1506	1510 (1512)	Hwy 85 and as directed by Qtr Pty	Serial 1. Atch: 2 cl III trks, 1 aid/evac veh. Det: 11/4-T-trk to Qtr Pty; 1 sup trk to TF trs.
									CP 1	1556	1600 (1602)		
									CP 2	1628	1632 (1634)		
									CP 3	1712	1716 (1718)		
									CP 4	1756	1800 (1802)		
									CP 5	1830	1834 (1836)		
									RP	2002	2006 (2008)		

TYPICAL ROAD MOVEMENT TABLE

ables you to quickly determine the LGTHCOLM and the PST for a given size march element moving at any of the standard rates of march and maintaining any of the standard intervals. For a march element containing a total number of vehicles not shown in the table, use the next higher number. Although this will give you a certain amount of "fudge factor," it is no more excessive than the "fudge factor" provided by using the actual march formulas.

Another method for LGTHCOLM and PST factors is to compute the LGTHCOLM and PST for specified elements of the command which normally move as a march unit. Quartering parties, trail parties, and scout platoons are not included in this table as these elements normally move by infiltration rather than in an organized march column. Although this type of table is extremely convenient, it does have one serious disadvantage. Its accuracy can quickly decrease through the loss of vehicles due to combat or other causes. Therefore, the user must be alert in detecting significant changes in vehicle strengths which will invalidate the table unless it is modified.

A word of caution is in order concerning the use of these tables. They are all based strictly on mathematical calculations. Each unit should develop a data base by recording their actual experience as they conduct marches. Their tables should then be revised as required to reflect their actual march experience.

Now that you have computed all the data required, how are you going to disseminate it to the march unit commanders? Again, there are a couple of ways of doing it.

ROAD MOVEMENT TABLE

One method is to develop a road movement table. This is a very thorough document, and is also an excellent way to spend a great deal of valuable time.

Since it is a fairly common practice to issue a strip map, why not expand the strip map slightly and use it just like an overlay-type operations order? This single document will provide the march unit commanders, and the vehicle commanders and drivers, with all the information they need. It contains all the vital information provided by the table and in easily usable form.

As you can see, there are many ways of developing march data and preparing movement orders. Much of the data can be precomputed; however, you can stick with the old traditional procedures. Take your choice!

MAJOR EDWARD D. HART graduated in 1960 from Central Michigan University and has served in numerous command and staff positions in Germany, Vietnam and CONUS.

ACCB: Tank finder and killer

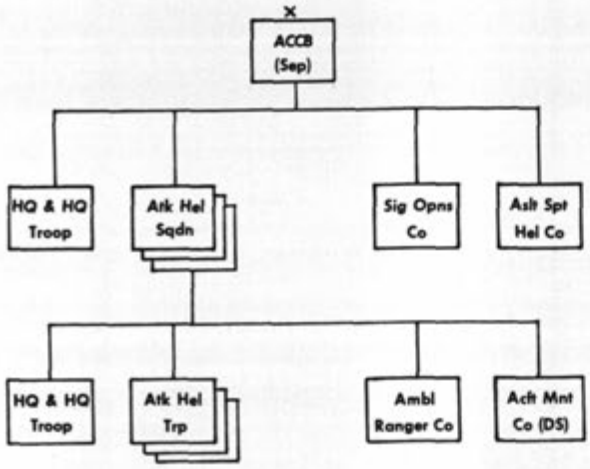
by Lieutenant Colonel Jimmy D. Weeks

From the time one cave dweller picked up a club to smash his neighbor's head, man has always tried to obtain advantages over his opponent. Today, leaders of every country in the world are still striving for advantages in numerous ways that are representative of their threat assessment. This effort takes on many appearances and the spectrum may range from war materiel technology to alliances and pacts. Any advantage can be boiled down as either strategic or tactical.

The United States Army has the capability to field in the present time frame, a tactical advantage identified as the Air Cavalry Combat Brigade (ACCB) Separate. A suggested separate ACCB includes a headquarters and headquarters troop (HHT), a signal operations company, an assault support helicopter company (ASHC) and three attack helicopter squadrons (AHS) each consisting of an HHT, three attack helicopter troops (AHT), an airmobile ranger company and an aircraft maintenance company (DS). So organized, the ACCB (Separate), as a minimum, can be assigned on the basis of one to each corps.

This organization can provide the corps commander a maneuver unit with enormous combat potential which can capitalize upon its inherent three-dimensional mobility and rapidly apply decisive combat power at any point on the battlefield. It possesses extensive communication, speed and firepower, which are the necessary ingredients of any successful battlefield endeavor. A study of past battles tends to prove the old axiom: "to be successful in war, one must be able to move, shoot and communicate."

The attack helicopter is the brigade's basic combat vehicle. It is the champion of mobility, enjoying freedom from the constraints of terrain and limited by visibility only during periods in which the infantry rifleman would also have difficulty seeing and fighting. The armament load of an attack helicopter has given it such a multitude and volume of organic firepower that it is a combat vehicle to be reckoned with



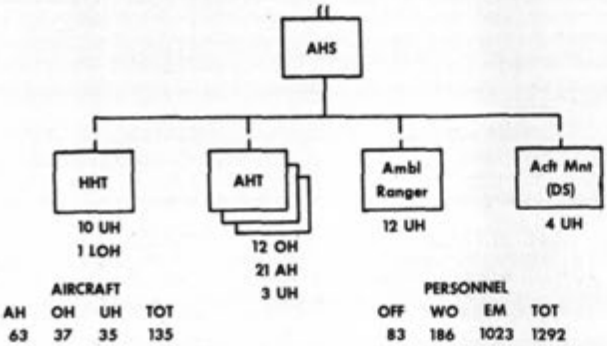
AIRCRAFT					PERSONNEL			
AH	OH	UH	CH	TOT	OFF	WO	EM	TOT
189	119	114	16	438	310	609	3688	4607

AIR CAVALRY COMBAT BRIGADE

in all future conflicts. Each unit within the brigade has an extensive communications capability ranging from frequency modulated (FM) and very high frequency (VHF) radios to ultra high frequency radios, all of which permit communications at every level of command. This all adds up to a maneuver unit whose potential for successful combat is limited only by the imagination of its commanders.

The brigade is structured to permit its employment as an entity, in various task force configurations, or as part of a larger force. The fighting arm of the ACCB is the attack helicopter squadron. The attack squadron, by itself or with other available ground elements and area support units assisting in maximizing the fighting effectiveness of their combat power, can locate, destroy or neutralize enemy forces by maneuver and shock effect. The squadrons are 100 per cent air transportable and heavy in armor-defeating firepower. In addition, they possess extensive communications networks.

Each troop is identically organized with three platoons, each with four observation and seven attack

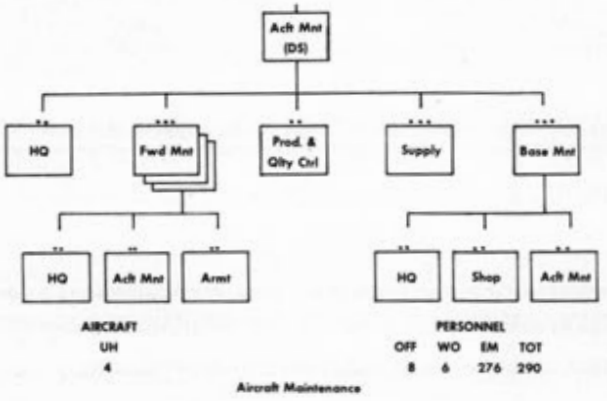


AIRCRAFT				PERSONNEL			
AH	OH	UH	TOT	OFF	WO	EM	TOT
63	37	35	135	83	186	1023	1292

Assault Helicopter Squadron

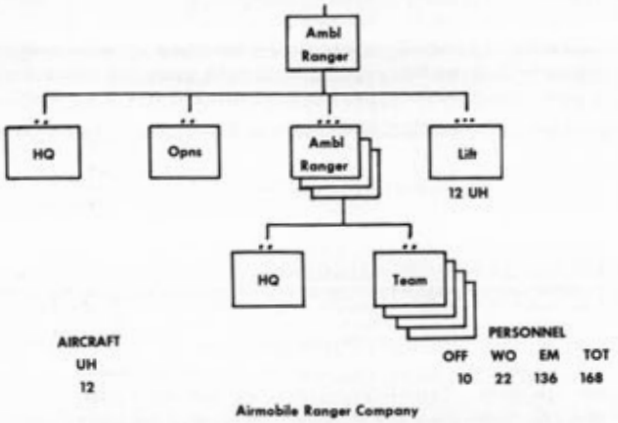
helicopters. From this type organization, based on crew and aircraft availability, the fighting unit would consist of three observation and five attack helicopters. This is a revolutionary but realistic approach to the problem of maintaining unit fighting strength at an effective level for continuous combat operation. Identically organized troops permit structuring of each force to mission requirements. For example, if a tactical situation required the application of two troops worth of firepower, then only two could be given the mission without re-configuring the squadron or, for that matter, the brigade.

The squadrons each have a cellularly organized and equipped direct support (DS) maintenance company from which each troop will obtain its DS maintenance and technical supply. This type of arrangement permits unrestricted mobility of each troop's firepower and lightness of their organic logistical support requirements.

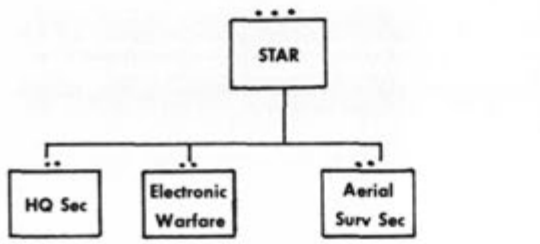


Aircraft Maintenance

The airmobile ranger company is designed to provide airmobile teams equipped and employed primarily to defeat armor, or to act as small ground target acquisition and surveillance teams. The company has three platoons of four 6-man teams and the necessary organic lift helicopters to accommodate company, platoon or team employment.
Each team will be provided
with ground-mounted
tank killing
weapons and equipment that permits long range reconnaissance patrol (LRRP) and/or ranger-type missions.



Airmobile Ranger Company



AIRCRAFT			PERSONNEL			
LOH	UH	TOT	OFF	WO	EM	TOT
1	6	7	3	11	9	23

STAR Platoon

The surveillance, target acquisition and reconnaissance (STAR) platoon in each squadron will provide sophisticated aerial surveillance, target acquisition and night observation systems (STANO), which extend the capability of the squadron to find and destroy the enemy under all conditions.

Within the brigade is an organic signal company which permits employment of the brigade anywhere within a theater of operations and extends the brigade's ability to communicate over a wide area.

The assault support helicopter company (ASHC) provides an organic means of rapidly lifting in a responsive manner, supplies that are required to conduct ACCB combat operations, such as Class III*A* and V*A*. This organization is the standard ASHC TOE with its own integrated direct support maintenance (IDSM) capability.

The brigade relies upon an area support system for its logistical support. The brigade logistical structure is designed to permit operation within the framework of CS3 and provides for a material management function center (MMFC). The "through-put" concept is the logistical mainstay of the brigade. A personnel and administrative section is also organic in the brigade to provide these associated services.

From this quick examination of the ACCB (Separate) it is readily discernable that the organization reduces the number of "non-fighters" and increases the "fighters". By shifting the logistical support burden to the area support commands, the emphasis in the brigade combat units is focused on the immediate requirements of combat which are fighting, communicating and maintaining. A corps or army commander who possesses this type unit will have a wide range of employment options from troop through brigade to accommodate a variety of missions. This "tank finding-killing" brigade is one that is suitable for any threat, has maximum combat power and a minimum number of organizations for combat and is capable of rapid strategic deployment.

In summary, it is any commander's ideal fighting force and is his tactical advantage in all geographical conflicts.

LIEUTENANT COLONEL JIMMY D. WEEKS graduated from Texas A&M University in 1956. Following service as squadron S3 and troop commander with the 1st Air Cavalry Division in Vietnam from 1967-68, he attended the Command and General Staff College. He is currently branch chief of Scenario and Control Branch, Directorate C (ACCB) of MASSTER.

Tank Gun or Missile?

by Bryant A. Dunetz

Picture the Somme River near Cambrai in France, on 15 August 1916. British guns are firing tons of projectiles on German trenches. The well-hidden German troops, deep within their trenches, are awaiting the end of fire and are ready to engage the attacking British infantry.

Moments later, the heavy artillery subsides, and over the horizon appear 32 steel monsters firing continuously from machine guns mounted within, which approach the German trenches. In a few hours, these fighting vehicles have penetrated the trenches to a depth of five kilometers and succeed in taking positions for which the infantry troops have fought in vain for many months.

Since that day, tanks have evolved into highly sophisticated weapon systems, though a tank may still be described as a mobile weapons platform with its design focused on armament and armor.

The ever-increasing struggle to provide tanks with an advantage in stand-off capability has led to the design of gun/projectile combinations characterized by increased range, higher velocity and larger caliber. Mixed families of projectiles have been introduced in gun systems to maximize lethality and to make it difficult for opposing armor to counter. Gun calibers have increased steadily to 152mm, with muzzle velocities approaching 5,000 feet per second.

Improvements have been made in other areas as well. For example, attention has turned from monobloc, steel-core, armor-piercing projectiles to sub-caliber penetrators utilizing discarding sabots and fin- or spin-stabilized, high-density penetrators.

Along with requirements for greater muzzle energy in large-caliber guns have come requirements for heavier vehicles, capable of withstanding the resulting recoil momentum generated by these high-capacity guns. Chemical-energy projectiles have surfaced as effective tank killers with HEAT and HESH projectiles in the foreground. Such projectiles do not rely entirely on their kinetic energy to damage the target.

For example, HEAT (high-explosive antitank) projectiles employ a shaped-charge warhead which produces a jet capable of penetrating extremely thick armor. HESH (high-explosive squash head) projectiles are designed to splatter a plastic explosive on the main armored surface—the resulting detonation causes the back surface of the armor to shear away and produce lethal spall fragments. Chemical-energy projectiles, with lower muzzle velocities and attendant lower aerodynamic stability than their kinetic-energy counterparts, generally have less chance of hitting the target.

Great strides also have been made in fire control systems for tank armament. Over the past 25 years, improvements in gun rangefinder technology have resulted in sophisticated stereoscopic rangefinders and, more recently, laser rangefinders which reduce range estimation errors to insignificant values.

Stabilization of armament systems in both the

Performance Considerations

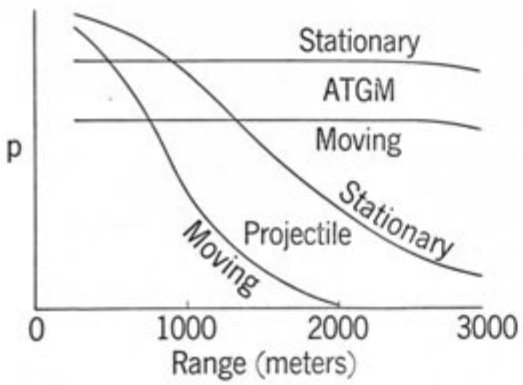
horizontal and vertical planes now permits extremely accurate fire while the vehicle is moving. The use of computers as an integral part of the armament system mechanizes the selection of precise trajectories to intersect the target. These, as well as other developments, have led to fire control devices which can lower the errors to values that are compatible with the overall armament system performance capabilities.

A new armament system with a potential for tank application appeared in Germany in 1943 in the form of an antitank guided missile (ATGM). Increased effectiveness in terms of long range, high accuracy and low weight is a realization today in any number of ATGM systems.

The delivery of extremely accurate, high-capacity warheads over long ranges with almost no penalty to the launch vehicle in terms of weight has introduced a new dimension to tank armament systems.

Most antitank guided missiles employ wire for the command-guidance link; the US *Shillelagh*, however, uses an infrared command link. ATGMs, because of their slow speed in flight, usually are equipped with shaped-charge warheads, generally greater than 100mm.

The development of armor protection in tanks has been a driving force for the development of high-capacity armament systems within some constraints



First Round Hit Probability

of tank weight and interior volume. Armor thickness has increased to provide greater protection against artillery shell fragments and low-energy, small-caliber, armor-piercing projectiles.

The employment of heavy tanks by certain countries of the world has greatly influenced the development and production of large-caliber, shaped-charge warheads.

The lower tank silhouette has contributed to the overall tank survivability by making the tank more difficult to hit by opposing armament systems due to the smaller presented area of the target.

New armor alloys and composite materials have not been adequately exploited in today's main battle tanks. With today's technology, it may be entirely possible to provide a high level of protection with only minor weight penalty.

For armor disposition, there appears to be little room for improvement in terms of location and sloping. However, a few tank-developing countries have made effective use of armor spacing and skirting plates.

Only recently has serious attention been given to the advantages of spaced armor. To illustrate the potential protection tanks may achieve with the addition of skirting armor, reference will be made to some experiments wherein shaped-charge rounds were fired at four inches of armor at 40 degrees obliquity with and without skirting plates.

The results indicate that shaped-charge projectiles can perforate the nonskirted target nearly 100 per cent of the time; however, when the target is protected with an additional thin steel plate placed a foot or so away from the main armor, shaped-charge projectiles generally are defeated.

In 50 years of tank evolution, the technology of armament systems has surpassed the technology of armor protection. However, advances in tank design have, in general, kept pace with the changing role of tanks in combat.

Today, the major powers have seen fit to provide their tanks with potent, large-caliber guns or missile/gun systems capable of delivering lethal and accurate fire with any one or more of several projectile types. The current caliber range for tank guns is from 100 to 152mm; and in ammunition from the more conventional armor-piercing capped projectile to the more sophisticated warhead of the *Shillelagh* missile which employs a precision shaped charge. The US is the only country in the world which presently advocates a fully integrated hybrid gun/missile system as the main tank armament.

Most countries employ separately mounted antitank guided-missile systems on the tank vehicle. The two-vehicle concept is being developed in England to provide a missile carrier to operate along with a gun tank.

Tanks have become the main striking force of ground troops. In this role, tanks may be used in concentrations to spearhead a ground attack when close air support cannot always be counted on to destroy opposing armor. Under circumstances such as this, it becomes clear that tanks themselves are the primary antitank weapons in the arsenal.

The conduct of the Arab-Israeli War of 1967 supports this view and shows that in an environment where the threat includes large numbers of opposing tanks, the most effective tank killers are your own tanks.

In the final analysis, the ground war is either won or lost with the ground forces; however, air power and air superiority are prime factors in the outcome of any war. Air power and air superiority, used to best advantage, create the proper environment for effective employment of ground troops and tanks to break through enemy defenses and to demoralize and ultimately defeat the opposing forces.

In considering tank armament systems in the antitank role, the threat first must be evaluated in terms of the variety, frequency and individual types of targets to be encountered in a particular theater of combat. The environment, coupled with the military objectives and doctrine, will dictate the type of combat which can be utilized most effectively, be it offensive or defensive.

Presently, US tanks are designed to perform the offensive role in a Central European environment as well as other areas of the world; however, the nature of the particular terrain of Central Europe has exerted a significant influence on the design of US tank armament systems.

As an example, range information and target visibility characteristics related to the terrain in Central Europe have had a considerable effect on the requirement to develop systems capable of delivering effective fire at ranges beyond 2,000 meters.

The remaining performance factors—accuracy, lethality, time of flight and rate of fire for both gun and missile tank armament systems—will be discussed independently, to show how each factor influences the system effectiveness.

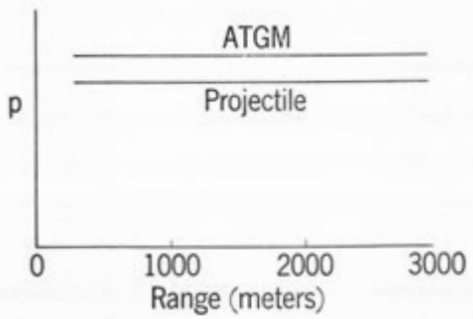
An accepted measure of effectiveness for tank armament systems—time to kill—will not be used here. This measure of effectiveness introduces many additional detailed considerations such as system reliability, human factors, complex interactions of tank duels and other relevant considerations. However, a simplified treatment using the preselected performance factors will illuminate the relative attributes of both gun and missile systems.

Unlike the situation recorded in World War II, tanks are expected to represent approximately two-thirds of the targets which will be engaged in the Central European environment. This supports the contention that tanks must have extremely effective weapons for killing other tanks. The remaining targets will consist of lightly armored personnel carriers, buildings, personnel targets, strong points and suspect positions.

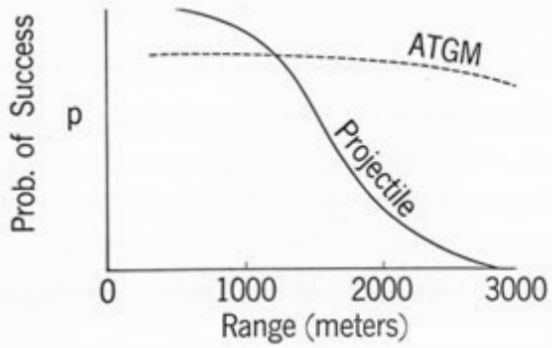
For the purpose of this discussion, personnel dismounted from APCs or infantry in the open on the attack, as well as lightly fortified defensive positions, are referred to as soft area targets, while single, heavily fortified positions and armored vehicles are referred to as hard point targets.

The type of target will determine the type of damage mechanism (blast, fragmentation, shaped-charge, kinetic-energy penetrators, etc.) most desirable to employ in the projectile to be used against the target.

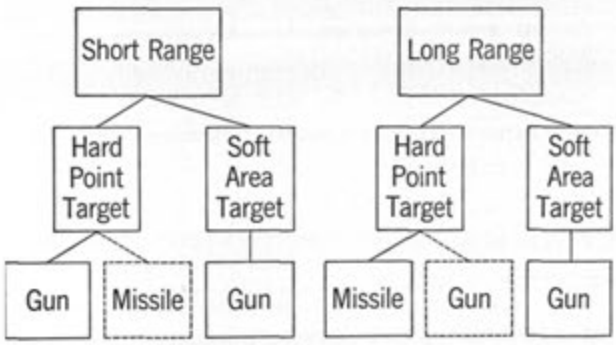
With some knowledge of the threat within the



Probability of M or F Kill given a random hit on a tank.



Effectiveness versus range



Role of missiles and guns.

environment, the next step is to examine the ranges at which tank engagements are likely to occur. World War II data, based on tanks that were actually knocked out in combat, show that nominally 50 per cent of the engagements occurred at ranges less than 800 meters, while fewer than five per cent occurred at ranges greater than 2,000 meters. Field experiments conducted more recently on similar terrain—to gather data on the maximum range for intervisibility—generally support the records of World War II and indicate that the greatest percentage of engagements will occur between 1,000 and 1,500 meters.

Experience has proved that it is easier to raise the level of lethality of an armament system than to raise the level of its accuracy. Let us consider the first round hit probability for both missiles and projectiles as a function of range for both moving and stationary targets. For stationary and for moving targets, the target tank may be assumed to be fully exposed; the hit probabilities for moving targets will vary with the speed of the target and the direction of target movement relative to the attacking tank.

It has been determined that antitank guided missiles have a relatively high first-round hit probability compared with that of projectiles, and that the hit probability of ATGMs is not sensitive to target movement or to an increase in range.

In contrast, the accuracy of most modern projectile/gun systems drops off rather sharply to unacceptably low levels of hit probability for ranges beyond 1,500 meters for stationary targets and 800 to 1,000 meters for moving targets. These facts would tend to establish the overwhelming effectiveness of the antitank guided missile, if hit probability were the sole basis for effectiveness. This is not the case, of course, and therefore other performance considerations must be integrated before any conclusion can be drawn.

Given a hit on the opposing tank, what can be expected in terms of the damage-producing capabilities of missiles and projectiles? The separation in performance between the antitank guided missile and the projectile, from this standpoint, is insignificant.

The interesting aspect of this factor is that projectiles (kinetic-energy armor piercing discarding sabot or chemical heat) and antitank guided missiles both retain an acceptable performance level for defeat of tanks throughout the interval of range under consideration. This is particularly noteworthy when one considers that the kinetic-energy round loses velocity and momentum as the range is increased but nevertheless retains its lethality out to 3,000 meters.

The third performance factor to be discussed is time of flight, the key factor for demonstrating a significant shortcoming in the guided missile. At the longer ranges—that is, beyond 2,000 meters—there is a dramatic departure between the performances of projectiles and ATGMs.

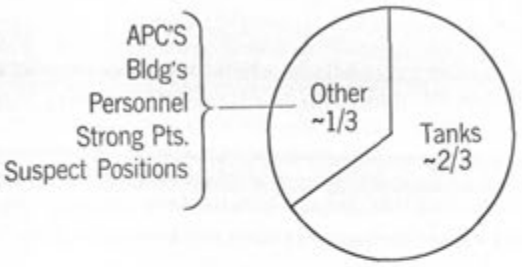
At the longer ranges, flight times for ATGMs in excess of ten seconds are not uncommon. Relative to the possible degrading effect of the flight time on the overall performance of the armament system, consider the question: How far can a tank target travel in ten seconds, assuming it is moving at a speed of 30mph?

For a flight time of ten seconds, say the target vehicle can travel roughly 450 feet. Since—with current missile systems—the operator is required to maintain the target in his sight during the entire flight time of the missile, the additional question arises: What are the chances that the operator will be able to maintain this target in his sight for the entire flight time of ten seconds while the target is moving over unknown terrain at a speed of 30mph?

At longer ranges and greater tank speed, the tank theoretically can cover an even greater distance. During the time the target is moving, the crew will take every advantage of the topography for concealment and protection.

An additional consideration comes to light during the evaluation of the influence of flight time on the overall performance of the system—namely, all presently available antitank guided missile systems require that the launch vehicle remain motionless and retain a broad field of view. If the tank target returns fire and hits the tank or otherwise obscures the missile firer's field of view during the flight time, then the chances of the missile arriving on target are lessened considerably.

One of the implicit considerations within the time-to-kill performance factor is rate of fire—the number



Tank targets in a European environment.

of rounds that can be fired by a gun or missile armament system in a specified time. Rate of fire generally includes such items as time to acquire, time to load and time to fire.

As would be expected, the times to fire for guns and missile armament systems are nominally the same for the first round and increase slowly with the range of engagement. Subsequent firing of rounds must—of necessity—include time of flight, if a kill is not achieved on the first round. Based on significant differences in time of flight for projectiles and missiles, it follows that more gun rounds than missiles can be delivered on target in a given time.

In spite of the argument used here, which raises some serious questions about the effectiveness of missiles in actual combat, the importance of accuracy —the first-mentioned performance consideration—as measured by hit probability cannot be overshadowed. The selection of the proper tank armament system must, first and foremost, be heavily influenced by this one factor.

In comparing the relative effectiveness of both types of systems, a crossover is implied in effectiveness at some intermediate range, possibly between 1,000 and 1,500 meters. This fact reinforces the premise that there is a requirement for both the ATGM and the projectile in an optimal tank armament system.

Range has been determined to be a key parameter in performance evaluation. When tank engagements are separated according to range, the conclusion is reached that against hard point targets at short range, the gun system emerges as more effective on an overall basis. However, the missile system (in many cases) is still capable of performing the same job.

Against soft area targets, defined previously as various composites of personnel and equipment, the gun system will generally be the choice. This is due mainly to the requirements for high-explosive and canister ammunition to maximize effectiveness against such targets.

For long-range, hard point targets, the missile is clearly superior; however, the gun system, as indicated, also is capable of achieving a reasonable level of performance. For the soft area targets at the longer ranges, the gun system is more desirable.

Each system has shortcomings and desirable attributes. Gun systems will supply high rate of fire for short-range engagements; guided missiles, being fired precisely, are required at the longer ranges.

The combat effectiveness of guided missiles in an antitank role has not yet been measured; therefore, the lack of combat experience and the present incomplete picture of system constraints leave an area of uncertainty with respect to this highly sophisticated weapon. Guns, on the other hand, have had their days in combat and have proved their overall reliability.

The performance of infantry antitank guided missiles has shown that it is not necessary to use large (152mm) shaped charges to effect severe lethal damage on tanks. This being the case, why shouldn't the future generation of tank armament systems employ guns and missiles with calibers of the order of 100 to 115mm?

With today's technology it would be possible to achieve the effectiveness of the large-caliber gun systems with much smaller calibers, without any degradation in effectiveness. The military significance of such a development would be measured in terms of reduced interior volume required for ammunition storage, reduced silhouette, and probably more important—increased survivability.

BRYANT R. DUNETZ is the Assistant to the Director of the Ballistic Research Laboratories, Department of the Army, at Aberdeen Proving Ground, Maryland.

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Position and Azimuth Determining System

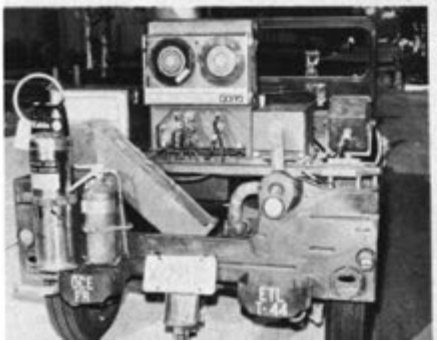
BY LORAN F. McCORMICK

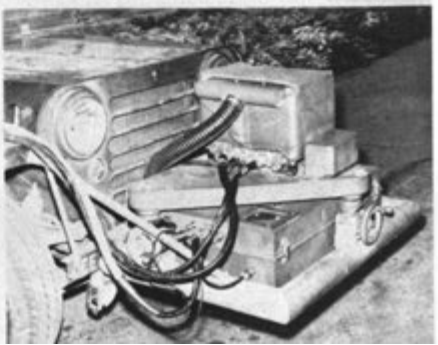
As the Army becomes more mobile and its strike capability is extended over an ever-increasing range, the need for rapid, accurate position and direction information becomes even more essential. The use of highly-powered and highly-sophisticated weapons systems precludes rough compass readings, guessed elevations and estimated distances. Position and direction information must be as accurate as the armaments it aims. Further, the growing use of combined arms necessitates that each element of a strike force know precisely where other friendly elements are located—at all times. If this information is to be at all useful, it must be computed and delivered in an extremely short time span.

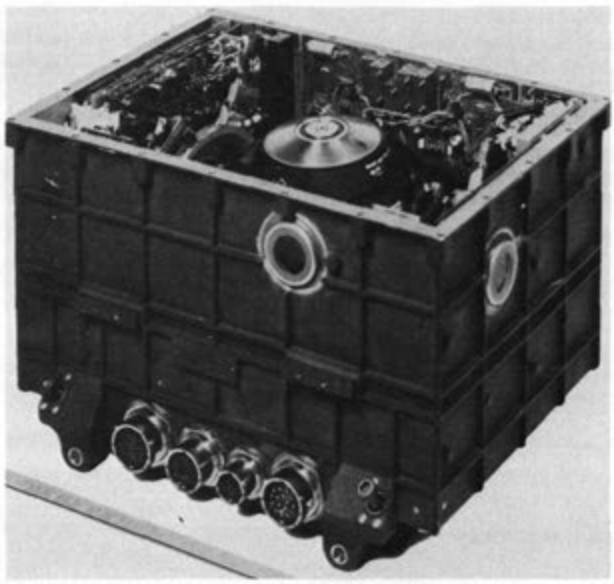
Precise directional equipment, using radio waves, microwaves and even coherent light lasers have been developed in recent years. Aircraft guidance systems provide extremely accurate, continuous information as to direction and position, and mapping satellites now supply new and detailed topographical data.

However, such equipment fails to satisfy the Army's requirement for an all-weather, self-contained position and azimuth determining system. Such a system must not only have a high degree of accuracy and speed, but it must be simple to operate, easy to install, rugged and replaceable in the field. The Engineer Topographic Laboratories (ETL) at Fort Belvoir, Virginia selected the Guidance and Control Systems Division of Litton Industries to develop a system that would meet these Army requirements. Early tests of this new system, called Position and Azimuth Determining System (PADS), indicate that it will successfully supply the information needed by the Army in highly-mobile operations.

While PADS is built on proven systems and techniques, it is a new concept in directional equipment. Designed to be easily fitted in most Army vehicles, PADS not only has the capability of providing extremely accurate readings of position, elevation and azimuth, but can also complete a detailed land survey mission in a fraction of the time required by current methods. All of this is accomplished while the vehicle is moving at its normal land speed over any type of terrain. The system is completely independent of both weather and visibility restrictions. Once calibrated, PADS functions automatically and continuously computes precise survey data.







Inertial Measurement Unit

EQUIPMENT DESIGN

The Litton-built *AN/ASN92* aircraft navigation system was chosen as the basic building block for PADS and required only minimal modifications. A sophisticated computer program was then developed which contained a statistical model of all the significant system-error sources. This was combined with an active real-time Kalman filter to provide accurate navigation. The system was further modified to provide continuous accurate survey information. By bounding the remaining inertial drift errors with extremely precise velocity reference information, PADS converts an aircraft navigator's mile-per-hour error to a land surveyor's feet-per-hour error. The precise velocities were obtained in three ways:

- An extremely accurate zero velocity reference accomplished by bringing the vehicle to a complete stop for a short time,
- A laser velocimeter,
- A precise odometer unit measuring distance traveled in short periods of time.

CALIBRATION

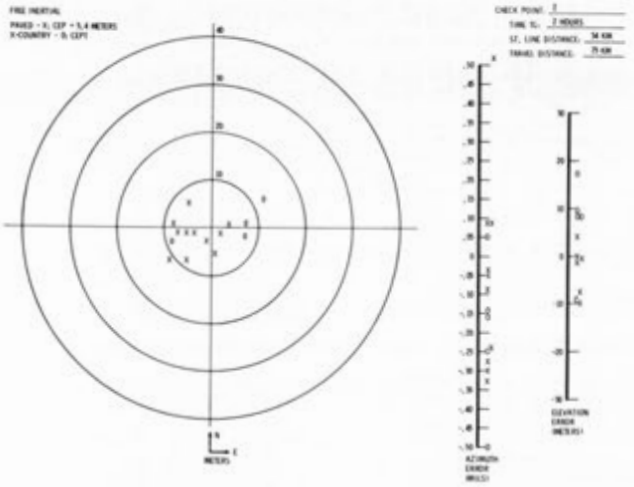
The system was so devised that virtually everything is calculated by the computer. The operator simply sets the system mode switch to calibrate, at which time PADS goes through a one-hour, self-calibration without requiring operator intervention. When the system indicates that calibration is complete, the operator drives to a survey control reference point and inserts the coordinate and elevation directly to the computer through the telephone keyboard data entry. The azimuth of the gyrocompassed navigation system can be used directly and is already in the computer, or it can be transferred optically with a T2 theodolite into a porroprism mounted adjacent to the Inertial Measurement Unit (IMU). The optical angle between the azimuth marker and the jeep is also entered via the Control Display Unit's (CDU) keyboard, and the computer automatically adjusts the inertial system to remove the gyrocompassing error. This complete azimuth update requires only seven to ten minutes, including setup time.

SURVEY

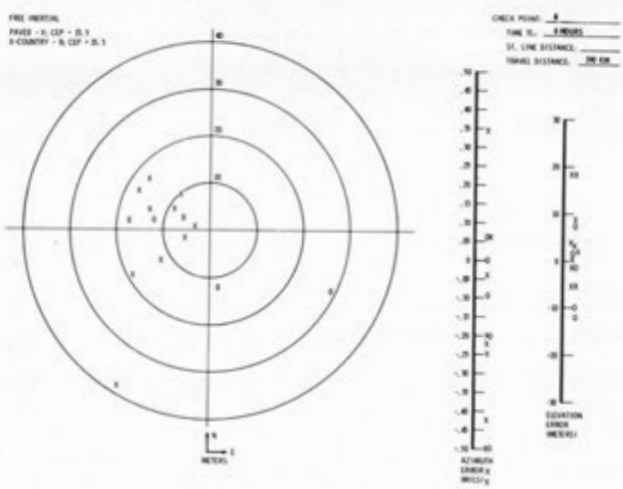
PADS is now ready to survey. The driver can operate the vehicle at any speed, over any terrain, through any weather conditions, day or night. His only requirement is to stop 20 seconds for a zero velocity update whenever he receives a warning from the computer. During this stop, PADS automatically corrects any system errors. Frequency of stops can be every ten minutes if no velocity aids are used; or once an hour if the laser velocimeter is providing velocity information.

The system continuously calculates position, elevation and azimuth in any one of the seven earth spheroid references and this information is available to the operator via a light display on the CDU. Any readout or test information can be obtained by appropriate positioning of the display's control switch.

Control Display Unit



Two-Hour Test Data



Six-Hour Test Data

Upon arrival at a location where reference coordinate information is desired, the operator simply switches the display to readout Northing, Easting and elevation in UTM coordinates. If azimuth is desired, azimuth reference it obtained by use of the T2 theodolite. The distance from the porroprism to the theodolite and this angle are then entered into the computer through the CDU keyboard. The computer then calculates and displays the azimuth angle of the reference from North as well as the position and elevation of the theodolite offset from the IMU. The system can be used to identify subsequent locations for six hours or more. In fact, the present system has been operated for up to ten hours without any significant degradation from the accuracy of the standard six-hour mission.

VEHICLE MOUNTING AND FIELD TESTING

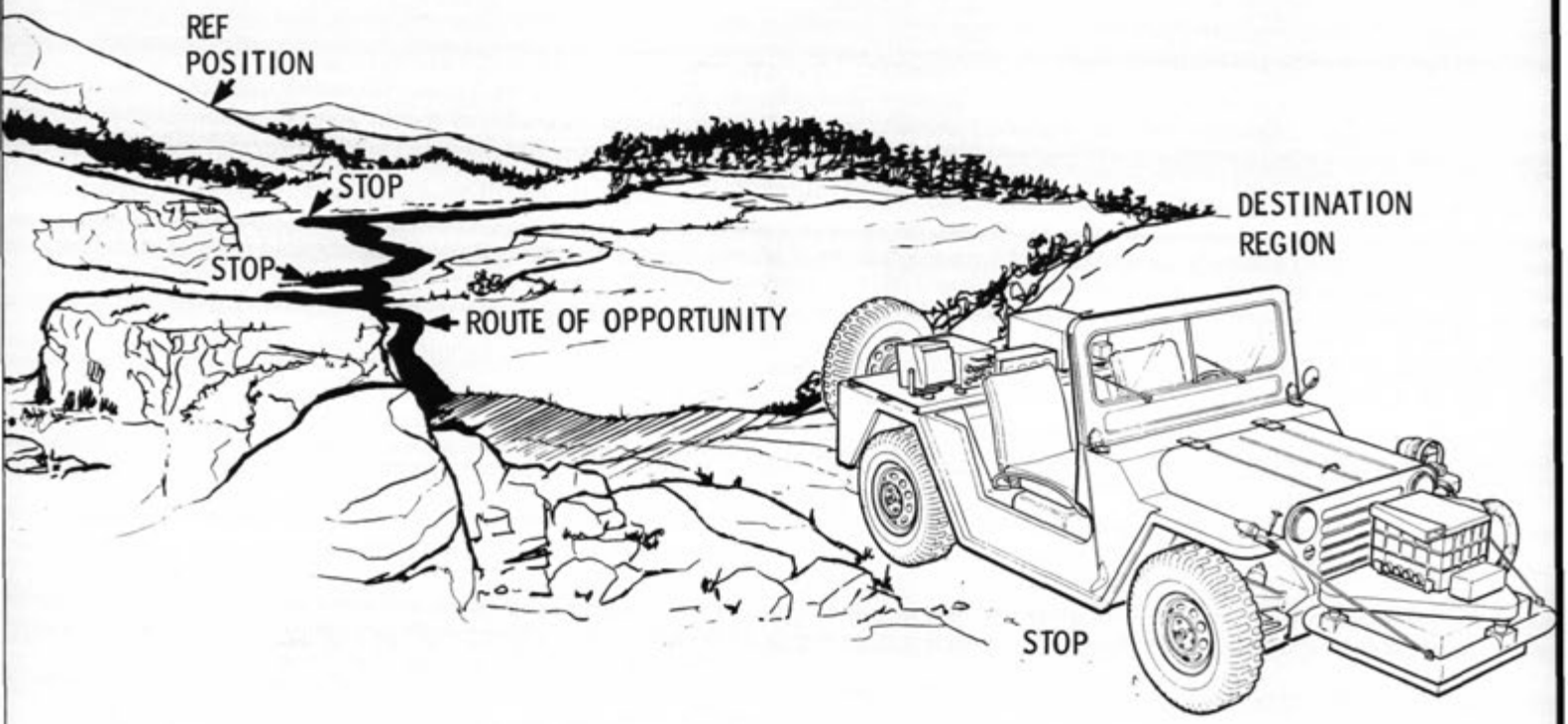
Since requirements for survey or position information vary widely, a portable PADS system attached to two shock-mounted pallets, which can be carried by two men and be mounted in a variety of vehicles, can provide extreme flexibility for the Army without requiring a special purpose vehicle or modifying the signature of a current vehicle. The *AN/ASN92(V)* is adaptable to this configuration and can be mounted on any vehicle such as a jeep, tank or helicopter. If requirements dictate average drive periods longer than ten minutes between stops, then a special purpose vehicle could be assigned which would incorporate a velocity-measuring device such as the laser velocimeter.

The developmental PADS system, which underwent tests on paved roads and cross country in Los Angeles and Ventura counties, was mounted on a standard Army jeep. The PADS Army acceptance data showed that the system will operate for six hours with a position circular error of probability (CEP) of less than 20 meters, an elevation error of about ten meters RMS, and an azimuth error of about 0.3 mils RMS. These results were obtained while operating over an open traverse at any vehicle speed and, for the acceptance tests, for a course distance of about 190 kilometers.

APPLICATION

The versatility of the PADS system can be shown by considering a number of different situations:

- Artillery Positioning—A vehicle with PADS on board could select artillery sites and quickly provide azimuth information hours or days ahead of weapon movement. This site information could be digitally transmitted directly from the PADS computer to the fire direction center (FDC). When the weapon arrives, it can be moved directly into a surveyed position and can be immediately readied for surprise or mass fire. PADS could also accompany the weapon to a desirable location and transmit by radio the position information to the FDC.
- Common Control—By moving from one weapon to another PADS can more readily obtain a common survey control hundreds of times faster than present methods. This movement and information can be recorded as the jeep is traveling and can be reduced by a computer later at the FDC or transmitted by radio from each location. This control allows a massing of fire, delivery of surprise fire, transfer of target data between units and exchange of general intelligence data.
- Map Plotter—A vehicle's position can be continuously plotted via a map plotter mounted in the vehicle controlled by the PADS computer. This would allow



the operator to drive or lead others through forested or unknown areas to a specific destination without regard for weather conditions, land marks or time of day.

• Mapping—As the operator drives the vehicle, accurate mapping of roads in an area can be performed by continuously recording position and elevation using a magnetic tape recorder. These tapes can later be played back through a computer and X-Y plotter producing a map to any desired scale. Accuracy of the developmental system is clearly demonstrated by recordings which show a trace along one side of a highway and a distinct second trace along the other side of the highway on the return trip.

• Extended Control—Some units such as missile units may not move a great distance during any one-day period. PADS could operate for a few hours at a time each day and then be shut down for the night. The next day it could be reinitialized with the previous day's control information and proceed on its mission. This procedure could be repeated for several days while still maintaining survey-type accuracy.

IMPROVED ACCURACY

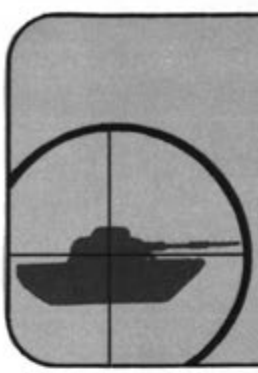
The accuracy of the system can be improved immeasurably by stopping for updates more often. For instance, if PADS were given zero velocity information by stopping every five minutes instead of every ten, the accuracy of the system would be improved by a factor of four.

If, in addition, the route of opportunity allows the system to pass over a known survey control monument or previously surveyed point, the system can adjust previously surveyed points, reducing their errors by 50 per cent or more. Thus, judicious planning of a survey mission can improve accuracy considerably.

IN CONCLUSION

As PADS can be adapted to any vehicle, and fulfills the Army's special requirements for direction and position information, the system will significantly reduce the problems of survey control. With PADS aboard their land vehicles, Army units would know precisely where they are, where they are going and what route they are following as they proceed to their mission assignments.

LORAN F. McCORMICK, a graduate of UCLA, is the program manager for the PADS Program at the Guidance and Control Systems Division of Litton Industries.



short, over, lost, or ... TARGET

This department is a range for firing novel ideas which the readers of ARMOR *can sense and adjust. It seeks new and untried thoughts from which the doctrine of tomorrow may evolve. Items herein will normally be longer than letters but shorter and less well developed than articles—about 750 words maximum is a good guide. All contributions must be signed but noms de guerre will be used at the request of the author.* ON THE WAY"

Should All Armor Officers Be Rated?

by Captain Thomas L. Beale

Armor of today and tomorrow is developing at a rapid pace. Operations in Southeast Asia (SEA) have proved Armor's role in stability operations. Combat experience in SEA and tests being conducted in Europe and CONUS have verified the employment of air cavalry and attack helicopters as another dimension of Armor.

In the development of this new dimension of Armor, aviators have accepted the traditional missions, concepts and techniques of employment of ground armor and applied modifications commensurate with the aerial vehicle's mobility, agility, engagement ranges, vulnerability, logistical support requirements and minimal ground-holding characteristics. In the tradition of combined arms sharing successful experience through close coordination, successful programs or techniques experienced by Armor Aviation should be considered for ground Armor application.

The new dimension of Armor is experiencing phenomenal success in developing new equipment and techniques of employment. Aviation's rise to prominence in a short span of years may be attributable to personal emphasis being applied by rated aviators, who vary in rank from the junior warrant officer to the highest general officer level. Personal interest by aviators is generated by a "grass roots" feeling for the equipment and operational concepts applicable to their rating. This "grass roots" feeling is created by a successful program which requires each aviator, regardless of rank, periodically to demonstrate proficiency in operation, maintenance and aerial employment characteristics peculiar to the vehicle(s) in which he is rated. Demonstration of proficiency includes sole control of vehicle movement, written examination on operator's manual (dash 10) information, and annual written examinations covering all aspects of aircraft operation. Specific occupational hazards are accepted, financial compensation awarded, and constantly identified in "required attendance" safety meetings. In most cases rated aviators, regardless of assignment location, are given the requirement/opportunity to demonstrate their proficiency.

Armor officers from company grade to general officer level, in various command, staff and instructor assignments are not given the opportunity/requirement to operate and employ the vehicles of their primary MOS for five years or more! Non-aviation-rated senior officers who are responsible for decisions and recommendations affecting ground Armor operations are constantly exposed to the operation and convenience of aircraft as they are habitually transported by helicopter during command and staff visits.

This, in many cases, may generate a greater familiarization with aircraft than with the ground Armor vehicles.

It is suggested that we in ground Armor recognize this successful program and establish procedures and schedules for "Rated" armored cavalrymen and tankers.

Should we establish a program for rated ground cavalrymen and tankers, with the opportunity/requirement (opportunity is purposely first and should be emphasized) to annually demonstrate proficiency through familiarization, performance and written reviews?

Programs to provide the opportunity or requirement to demonstrate proficiency should include the following:

- Vehicle automotive, communication and weapon(s) or weapon(s) station maintenance and operation.
- Prepare to fire.
- Conduct of fire; vehicle, crew served and personal defense weapons.
- Radio telephone procedures.
- Cross country maneuver of combat vehicle related to primary MOS.
- Familiarization with appropriate publications; TMs, FMs, ATTs, etc.
- Mounted and dismounted land navigation.

Tactical employment of appropriate vehicles and units is one area not currently evaluated by Aviation tests. Both ground and aviation rated Armor officers should be given the opportunity to demonstrate proficiency in tactical employment.

Some of these requirements can be adequately demonstrated with training devices such as laser subcaliber devices, driver station simulators, closed loop radio systems and written examinations. Qualification with personal defense weapons may be conducted at indoor ranges with minimum modification to existing ranges.

Training devices would be cost effective; but on-vehicle training of at least one phase is essential to renew the "grass roots" feeling of vehicle motion and cramped positions in fully combat-loaded Armor vehicles.

Have you been afforded the opportunity to demonstrate proficiency in the vehicles related to your MOS?

CAPTAIN THOMAS L. BEALE graduated from the Armor Officer Advanced Course in 1970 and subsequently served in the Director of Instruction's Office and Doctrine Development, Literature and Plans at the Armor School. He is currently attending the University Of Tampa.

HOW WOULD YOU DO IT?

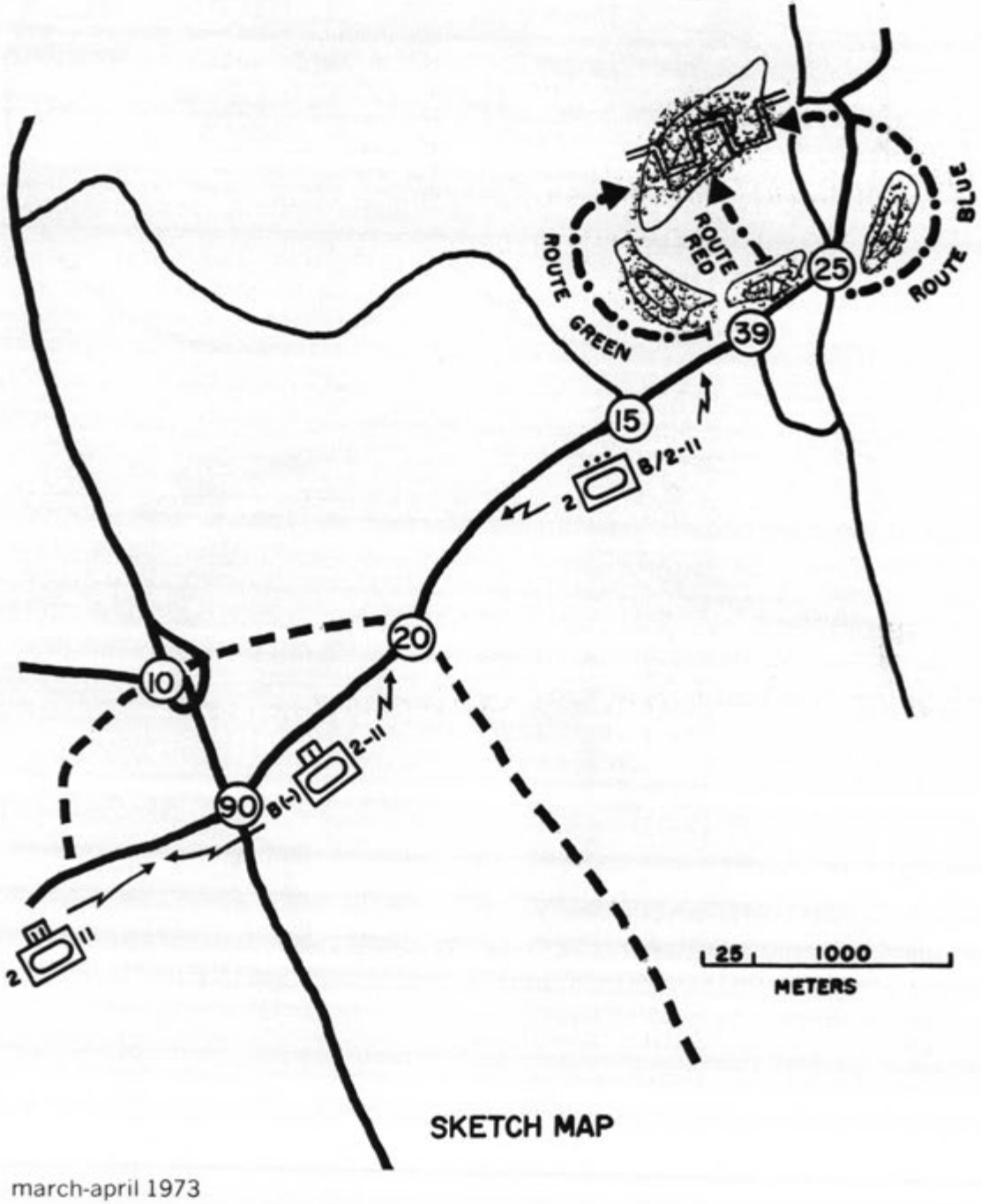
A PRESENTATION OF THE US ARMY ARMOR SCHOOL

AUTHOR: CPT Larry D. Graves

ILLUSTRATOR: SP4 D. J. Pedler

SITUATION

You are the platoon leader of the 2d Platoon, Team B, TF 2-11 Armor, 25th Armored Division. The platoon is conducting an advance guard mission for TF 2-11 Armor, and is moving in a column by bounds northeast along a hardtop road about 2 kilometers ahead of Team B (see sketch map). You receive a call on the radio from the team CO that an element of an aeroscout platoon in the vicinity of check point (CP) 39 has spotted some enemy north of the road. His instructions are to develop the situation and to eliminate the threat if within the platoon's capability. The platoon arrives at CP 39 where the aeroscout team gives you the coordinates of the suspected enemy. Moving on foot to a vantage point, you observe the suspected enemy position. Enemy identification is not possible but movement is detected. The aeroscout team then departs from the location to continue its mission. The situation must be developed by fire. You move your platoon into hull defilade and have the men fire into the suspected enemy with the main guns because of a likely enemy armor threat. The enemy returns automatic weapons fire and tank fire. After determining that there are 2 enemy tanks with 1 APC and a squad of infantry in prepared positions, you send a spot report to your team CO: he decides that this enemy threat is within your platoon's capability to attack and destroy. Three possible routes of attack are open—routes Green, Red, and Blue (see sketch map). HOW WOULD YOU DO IT?



SKETCH MAP

SOLUTION

Attack along route Green. Time is of the essence in an advance guard mission. The enemy threat must be neutralized if this is within the platoon's capability, and the original mission continued as soon as possible. The success of this attack depends on the following actions:

(1) Choose the most covered, concealed, and the fastest route.

(2) Attack the enemy position at its weakest point—the flank or rear.

(3) Use supporting indirect fires to keep the enemy infantry pinned down and enemy tank crews buttoned up; and to conceal the noise of your platoon's movement to the objective, thus, maximizing deception and surprise.

(4) Attack aggressively and remember to keep the team CO informed of your actions at all times. When you have destroyed the enemy and swept the objective, inform the CO on the status of the platoon. He may want the platoon to continue the advance guard mission. If the attack is successful, you will not have held up the forward movement of the task force.

DISCUSSION

Routes Red and Blue were not selected for the following reasons: Although route Red is the shortest route to the objective, it affords no cover and concealment and the platoon would be attacking into the enemy's strongest point. Thus, it is the least desirable route because the attacking platoon would be vulnerable to enemy observation and direct fire from the beginning of the attack.

Route Blue satisfies the technique of attacking the enemy's weakest point by attacking the flank. However, there are three major disadvantages to this route: (1) It is the longest attack route and time is critical in an advance guard mission. The progress of the column behind the lead platoon should not be impeded. (2) This route would cause the attacking platoon to expose its flank to enemy observation and direct fire initially and during the last half of the movement to the objective. (3) The last, but not to be considered the least major disadvantage, lies at the northern end of route Blue. The attacking platoon must cross two major roads, likely enemy avenues of approach, just prior to assaulting the objective, thus, there is a possibility the platoon may be detected and surprised by enemy elements coming from the north.

from the Armor Branch Chief

Let's Clean Our Own Linen!

Several recent personnel actions disclose that some commands may be "taking the easy way out" when an officer who has not performed well is selected for a PCS school.

A recent application for flight school included a favorable indorsement from the officer's company and battalion commanders. Although this officer was found physically qualified, he was not programmed into a flight class for several months because he was completing the year of troop duty required of all Regular Army officers. As a result, several months elapsed prior to flight school attendance since the officer's last efficiency report had been rendered. Before placing the officer on orders, Branch informally queried the command about his performance and was told that "the officer is highly recommended." This informal "green light" caused Branch to send the man to flight school. Subsequently, a very poor OER arrived in Branch covering the period for which the officer was "highly recommended." In summary, this officer should not have begun flight school and would not have, had Branch been informed that his performance did not measure up to acceptable standards.

Cases similar to this have occurred with officers selected for and placed on orders to the Advanced Course.

You must assist Branch in cases such as this. If an officer who has performed poorly receives orders to some long and costly school, we need to know his shortcomings before he is sent to fill a slot that a more-deserving Armor officer should fill.

Field Grade Officers

A shortage of field grade officers in some career branches currently exists. These understrength career branches have been authorized to send letters to field grade officers of overstrength career branches, inviting them to transfer to their branch. Within the past few weeks, several Armor officers have received letters from these understrength career branches. I want to make it crystal clear that Armor Branch has not submitted any officer's name to another career branch. Armor Branch takes no part in this selection, and in many cases is not even aware of who is being solicited. If you received a letter from another branch inviting you to join them, you were not identified by Branch for transfer, but rather your record was impressive in the eyes of that branch.

Company Grade Assignments

Stability continues to be the key word in the company grade assignment pattern. As a general rule, all company grade officers are remaining on station a minimum of two years and many officers can expect to serve three-year tours. Despite the emphasis on stability, Armor Branch continues to receive worldwide requirements on a continuing basis. Recently, a large number of Armor captains were alerted for duty in Germany. To satisfy our heavy requirements, we have instituted a program of overseas equity whereby officers are selected for Germany based on their overseas turn-around time. At the present time, we are attempting to maintain an overseas equity of at least 36 months. Armor continues to receive a

small number of short tour requirements, mostly for Korea. Whenever possible, these requirements are filled by volunteers. If there are not enough volunteers to satisfy our short tour requirements, we then involuntarily assign officers with no short tour experience against these requirements. At the present time, there are no second involuntary short tour requirements for Armor company grade officers. However, if you have served only one short tour and returned from it prior to July 1969, you are at the top of our short tour equity list and may have to be reassigned to a second tour if we receive unforeseen short tour requirements.

Armor also continues to provide a large number of officers to CONUS training centers. Whenever possible we attempt to rotate officers from a TOE assignment to a training center assignment. Thus, the majority of our training center requirements will be filled by officers returning from Germany. The above information explains, in general terms, some of our current assignment policies. Unfortunately, these policies can be very dynamic and may change rapidly as a result of emergency requisitions or priority shifts. If you have specific assignment questions do not hesitate to write or telephone your Armor Branch assignment officer.

CGSC Nonresident Program

In addition to the resident program, the US Army Command and General Staff College (CGSC) presents its course in a Nonresident Program (NRI). The nonresident program is open to all officers who have completed the career course.

The CGSC NRI Program, first established in 1922, was revised in 1962. The course generally parallels resident instruction, but includes only those subjects that would be taught in time of national emergency. Thus the course is shorter. The Command and General Staff Nonresident Program may be completed in the following ways:

Entirely by correspondence, except for the final two weeks of instruction (Phase X) which must be taken in residence at Fort Leavenworth to qualify for a USACGSC Diploma.

Through the USAR School system which involves attendance at local USAR schools, followed by a short period of Active Duty for training at USACGSC, Fort Leavenworth, during summer months for one tour of eight weeks or two tours of four weeks. Summer sessions may be consecutive or nonconsecutive. A diploma is awarded following satisfactory completion of the second four-week phase.

Completion of the first half of the course by correspondence or USAR school and then entering on Active Duty for Training for one tour of eight weeks or two tours of four weeks.

Maximum interchangeability among the three methods described above is permitted, although the first option pertains only to those officers on Active Duty. The other two plans are for officers not on Active Duty who desire to continue their military education.

Armor Branch views the nonresident program as being particularly suited for officers with growth potential. Participation in the program will certainly require considerable effort, but the benefits are both valuable and tangible. Also, enrollment or completion of the course, does not preclude consideration if you are otherwise eligible for selection to the regular course.

Should you desire more detailed information write to:

Director of Nonresident Instruction
US Army Command and General Staff College
Fort Leavenworth, Kansas 66027

Service Agreements

In the continual process of making the actual Branch structure conform to the desired structure, many recent year groups have become overstrength in officers with Voluntary Indefinite Agreements. Specifically, 1967, 1968 and 1970 far exceed the desired strength with 1969 and 1971 following closely behind. As a year group (all officers who entered Active Duty in a fiscal year) approaches 100 per cent of desired strength, we must become more selective as to which officers can be granted career status, and once a year group exceeds the desired strength only an extremely limited number of those officers who have demonstrated the highest potential for future service can be afforded the opportunity to go Voluntary Indefinite. In the same process, as a branch's year group exceeds desired strength, Armor Branch must take a more critical look at the file of every officer who has a Competitive Voluntary Indefinite Agreement to determine which officers can continue in a career status. Armor Branch's ability to grant short term extensions is contingent upon the same restrictions as Voluntary Indefinite Agreements, and it appears as if additional short term extensions, especially in year groups 1967 through 1971 will be almost nonexistent for some time to come.

Branch Visits To Installations

Branch visits to CONUS installations continue to be a vital part of our counseling and interview program. Branch trips tentatively scheduled for the remainder of this fiscal year are:

April: Fort Hood, Fort Polk, Fort Bliss, Fort Sill, Fort Wolters, Fort Carson, Fort Riley, Fort Lewis, and the Armed Forces Staff College (Norfolk).

May: Fort Rucker and USAREUR.

Monthly visits are made to Fort Knox.

Visits To Armor Branch

Officers usually visit Armor Branch during the duty hours of 0800 to 1630, Monday through Friday. Since an officer may not be able to arrange a visit during these hours, interviews at other times may be scheduled on an individual basis. If you find it necessary to schedule an interview during other than normal duty hours, please call the Branch as early as possible to make an appointment with an action officer. Contact our receptionist at Autovon (22-31492) or commercial telephone (202 693-1492). She will refer you to an officer who will assist you in making an appointment.

When you arrive don't leave your family and pet(s) in the car, bring them into our remodeled reception room to wait for you.

Article 15s in 201 Files

Article 15s for non-judicial punishment will become a permanent part of the efficiency portion of 201 files on all officers as a result of a recent change to AR 27-10.

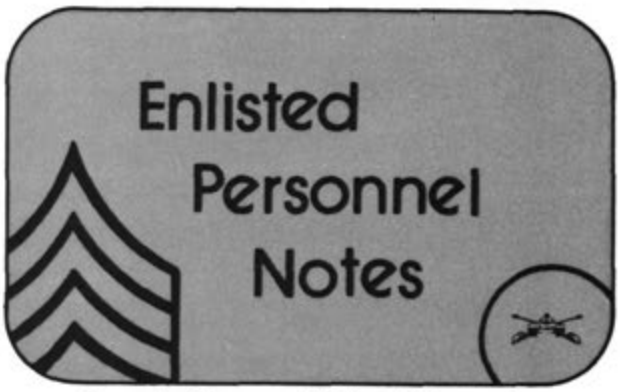
This change was brought about in an effort to insure that an officer's total performance is considered by promotion, school and other personnel selection boards.

The Army policy on filing Article 15s has been fairly stringent for officers all along. Prior to the recent change Article 15s were removed from the efficiency portion of an officer's 201 file after one year; however, the Article 15s were merely transferred to the historical section of the 201 file (not reviewed by selection boards).

This new policy applies to all Article 15 records including those imposed prior to the change in Army Regulations. Officials have indicated that Article 15s imposed prior to the change in regulations, which are now located in the historical section of the 201 file, will be transferred to the efficiency file when the file is audited. All files are audited prior to being reviewed by promotion or other personnel action boards.

Armor Ball In March

The Washington Area Armor Anniversary Ball is scheduled for 30 March 1973 at the Bolling AFB Officers' Club. If you are new in the Washington DC area, did not receive an invitation last year, have moved, or are going to be around on 30 March, please send us your address and a contact phone number. Write or call: Secretary (Major Bill Fitzgerald), 196th Armor Ball, Tempo A, Room 1-1021, 2d & T Streets SW, Washington DC, 20315, (202) 693-0690.



From the Director of Enlisted Personnel

TEMPORARY CHANGE IN PORT CALL PROCEDURES

All enlisted personnel, regardless of grade, who are assigned to Vietnam for duty with Military Assistance Command (MACV), United States Army (USARV), Army Security Agency (ASA) or 1st Signal Brigade are now being port called to the United States Army Oversea Replacement Station, Oakland Army Base, California. This temporary change in port call procedures is necessary to preclude hardship on the enlisted soldier. Previously, enlisted personnel serving in the ranks of sergeant or specialist (pay grade E5) and above were port called direct to an aerial terminal, but circumstances caused them to be redirected to the oversea replacement station after arrival at Travis Air Force Base. This procedure permits a last minute quick check to insure that a requirement exists in the Republic of Vietnam. These procedures will probably continue for the foreseeable future.

ADDRESS CHANGE FOR EER APPEALS

On 1 February 1973, the address for submitting Enlisted Efficiency Report (EER) Appeals was changed to: Commander, US Army Enlisted Personnel Support Center, ATTN: AGPE-E, Fort Benjamin Harrison, Indianapolis, Indiana 46216. This change was made to assure prompt processing, since the records needed for review are maintained at Fort Harrison. The change was announced in DA Message 201419Z December 1972, "Change of Address for Submitting EER Appeals."

All other procedures for submitting the EER appeals will remain as stated in DA Message 151608Z June 1972, "Changes to the Enlisted Efficiency Reporting System."

SQI AND ASI REPORTS

A recent survey revealed that only about a third of those qualifying for Special Qualification Identifiers (SQI) and Additional Skill Identifiers (ASI) have been reported with the appropriate SQI/ASI. The responsibility for such reporting rests with either the service school/training center or the individual's unit personnel officer.

By way of definition, the SQI is the fifth character of the MOS code, identifying special qualifications that an individual may possess, such as instructor **H** or logistics NCO **K** (Section IX, Chapter 2, AR 600-200).

The ASI, the sixth and seventh characters of the MOS code, identifies skills acquired through functional training. Examples include special skills in maintenance or operation of weapon and equipment systems or subsystems, and other training not identified by MOS or SQI (Section X, Chapter 2, AR 600-200).

Failure to properly identify those who have qualified for SQI/ASI often results in the trained man not being matched with the job requiring his skills. These failures can also lead to the expensive training of additional personnel beyond the Army's requirements for the special qualifications.

The various procedures for awarding and reporting the SQI/ASI are keyed to the status of the individual attending the training. The responsibilities and procedures for awarding SQI/ASI remain unchanged for those organizations operating under the PERMACAP or MASSDATA systems. The reporting of SQI/ASI by these organizations will be accomplished in accordance with AR 680-4 and MASSDATA User Manual as applicable.

EXPANDED CENTRALIZED SELECTION AND DISTRIBUTION SYSTEM

The system of managing the assignments and other personal actions, heretofore limited generally to those in pay grade E7 and above is now being expanded to the next two lower grades.

As a first step, custodians of personnel records have been asked to forward to the Office of Personnel Operations, DA, Attention: DAPO-EPC-SR, Washington, D.C. 20310, prior to 31 January 1973, the following documents for sergeants and specialists in pay grade E6:

- One copy of DA Form 20 (Enlisted Qualification Record).
- One copy of DA Form 2635 (Enlisted Preference Statement).
- One copy of all USAEEC Forms 10 (Enlisted Evaluation Data Report) for both primary and secondary MOS evaluations.
- One copy of the orders promoting the soldier to pay grade E6.

New records are not required for soldiers serving in pay grade E6 whose MOS is listed in paragraph 3-9a (4), AR 640-2. These are the special category personnel whose records are already in OPO. Likewise, records are not required for those who have submitted applications to retire prior to 1 July 1973.

A self-addressed DA Form 209 (Delay, Referral, Follow-up Notice) will be attached to the documents before forwarding them to OPO. The DA Form 209 will be returned to the soldier as evidence that the documents have been received by OPO.

Complete directions covering this vital action can be

found in DA Message DTG 291243Z September 1972, DAPO-EPC-SR, "Integration of Staff Sergeants and Specialists Six Into the Centralized Management Program."

FOREIGN TOUR POLICY CHANGES

Since 1 December 1972, volunteers may stay in long tour oversea areas up to a maximum of six years. Extensions will be granted in increments of from six to twelve months. Also authorized are extensions for periods of less than six months. This change to Chapter 7, AR 614-30 (Assignments, Details and Transfers: Oversea Tours) was announced in DA Message DAPE-PDD 021217Z October 1972, "Voluntary Extensions of Oversea Tours in Long Tour Areas."

Although more soldiers are taking advantage of extended oversea tours, approval of extension requests is not automatic. Oversea commanders must approve each application, and the cited message provides a caution to "consider whether such extension will result in personnel stagnation or will deny assignments for potential careerists and volunteers in desirable areas." In addition, DA retains the final approval authority.

Major considerations in the Office of Personnel Operations (OPO) when reviewing requests for extensions, shall continue to be:

- Worldwide and oversea command strength in the grade and MOS under consideration.
- Overall strength and priority of the command.
- Recommendations of commanders.

Requests sent directly to DA without oversea command approval will be returned without action. The use of proper channels will save valuable time.

Requests for extensions should be submitted eight to ten months prior to Date Eligible to Return from Overseas (DEROS), to provide sufficient time for the oversea command to take action and forward the request to DA for further processing.

Extensions will not be granted beyond ETS, so reenlistment or extensions of enlistment should be accomplished prior to submitting the request.

To insure that a matter of procedure does not block your oversea extension, consult your personnel officer and Chapter 7, AR 614-30.

NONCOMMISSIONED OFFICER EDUCATION SYSTEM

As the Army continues a transition into an all volunteer force, much effort is being exerted toward increasing capabilities and improving professionalism. Pay, living and working conditions, and professional development opportunities, to name a few, all are receiving considerable attention. Much publicity has been given to most of these efforts. However, many are not aware of what has been done in these areas, especially the efforts to improve professional education.

The major activity to improve the soldier's professional education is the Noncommissioned Officer Education System (NCOES). NCOES is a system of progressive professional education consisting of three levels of instruction; Basic, Advanced and Senior. Basic and Advanced level courses are now being taught at the Army Service Schools at 19 Army installations. The first Senior level class commenced at Fort Bliss during January 1973.

These courses use modern techniques in their instruction including tracked instruction, systems engineering of courses, educational TV, computer assisted instruction, cassettes and maximum hands-on equipment-type instruction. Additionally, some NCOES students are given the opportunity to take electives offered by local colleges and universities.

The NCOES supplements rather than replaces the former enlisted military education system. It adds formal leadership and skill training at the appropriate stages of the soldier's career, so that he will be better qualified to assume positions of higher responsibility.

Some of the benefits of NCOES are:

- Promotion points (42 for the Basic Course)
- Promotion of E3 to E4 (Basic Course)
- Promotion of any E4 to E5 who comes out on top in his class (Basic Course)
- Increased skill and leadership ability
- Self-confidence, self-satisfaction and professionalism
- Orientation and assistance in obtaining a Reserve commission for upper portion of Advanced or Senior Course graduating classes.

Selection of students for NCOES courses is on a best qualified basis from soldiers of the Active Army and Reserve Components who meet the following prerequisites:

- MOS Proficiency—An MOS Evaluation Test Score of 100 or higher to qualify applies to all courses.
- Leadership Potential—A clear, positive recommendation from the commander for attendance applies to the basic course.
- Grade— Basic Course: E4s and E5s either specialist or NCO. Selected outstanding E3 AIT graduates can be selected. Advanced Course: E6s and E7s specialist or NCO. Senior Course: E8s.
- Length of Service— Basic Course: An E4 must have less than 8 years of service and an E5 less than 12 years of service. Advanced Course: Both E6s and E7s must have less than 17 years of service. Senior Course: E8s must have between 17 and 23 years of service.

All courses require a certain length of service after graduation, but this varies with the length of each individual course. DA Pamphlet 350-10 contains the details.

For complete information on the courses, Basic, Advanced or Senior, consult DA Circular 351-42 and DA Pamphlet 351-3 both titled, "Noncommissioned Officer Education System (NCOES)," and your unit personnel officer.

ARMOR OFFICER SCHOOL SELECTIONS

ARMY WAR COLLEGE
6 August 1973—10 June 1974

LTC Dozier, James L
LTC Frederick, William R III
LTC Graves, Richard G
LTC Hancock, James H Jr
LTC Meyer, Richard M
LTC Mills, Robert W
LTC Molinelli, Robert F
COL Porter, Edward J
LTC Putnam, Earl L
LTC Saint, Crosbie E
LTC Springstead, Bertin
LTC Stokes, William M I
LTC Stotser, Don M
LTC Thompson, Bill T

AIR WAR COLLEGE
2 August 1973—22 May 1974

LTC Messer, Hollis D
LTC Sutton, Larry L

BRITISH IMPERIAL DEFENSE COLLEGE
January 1974—December 1974

COL Lauderdale, John R

CANADIAN NATIONAL DEFENSE COLLEGE
September 1973—July 1974

COL Coad, William F

INDUSTRIAL COLLEGE OF THE ARMED FORCES
8 August 1973—7 June 1974

LTC Combs, Oliver B Jr
LTC Jackson, Wilfred A

NATIONAL WAR COLLEGE
7 August 1973—5 June 1974

LTC Carpenter, Thomas E
LTC Smart, Ernest A
LTC Sullivan, Harry E B
LTC Westerman, Ted G

NAVAL WAR COLLEGE
23 August 1973—24 June 1974

COL Foster, Thomas G II
LTC Price, Roger J
LTC Shaw, Donald P

news notes

MG BURTON COMMANDS 3D ARMORED DIVISION

Major General Jonathan R. Burton is the new commander of the 3d Armored Division, replacing Major General William R. Kraft Jr. He comes to the 3d Armored Division after a tour as Deputy Commander of the Army and Air Force Exchange service in Dallas.

MG Jonathan R. Burton

General Burton was commissioned as a Cavalry officer in 1942 through the ROTC program at Michigan State College. In over 29 years of active service he has held numerous Armor and Cavalry related posts, including senior Armor tactics instructor at the Air Defense School and two tours at the Army Aviation School; first as Director, Department of Rotary Wing Training and later, Director, Department of Tactics.

In Vietnam, General Burton was a brigade commander and Assistant Division Commander with the 1st Cavalry Division. In 1971 he assumed duties of commanding general of the 3d Brigade (Separate), 1st Cavalry Division.

CW2 BRADSELL AWARDED DISTINGUISHED SERVICE CROSS

Chief Warrant Officer Peter Bradsell, 1st Squadron, 9th Cavalry, was presented the Distinguished Service Cross by Army Chief of Staff, General Creighton W. Abrams, on 28 November at Fort Hood. Bradsell received the nation's second highest award for heroism connected with military operations against hostile forces in Vietnam in May of 1971. At that time, he volunteered to fly a Vietnamese Army doctor into a fire base under seige for seven days. Two helicopters had already been shot down while trying to accomplish the mission.

According to the citation, Bradsell, "exhibiting exceptional flying skill and bravery under fire, skillfully landed his helicopter at the beleaguered fire base amidst impacting mortar and rocket fire."

When he was unable to return because of an aircraft power failure he immediately volunteered his services to the Vietnamese commander at the fire base, then repeatedly exposed himself to hostile fire while calling in air and artillery strikes against the enemy.

155TH AVIATION COMPANY RECEIVES CDEC'S UNIT OF YEAR AWARD

The 155th Aviation Company of the Combat Developments Experimentation Command received the Command's "Unit of the Year" award for 1972. The award was presented by Brigadier General Ray Ochs, who added the new streamer to the unit guidon held by Staff Sergeant Isaac Hart. To the General's left is First Sergeant James W. Pigott Jr., with company commander, Major William Whitworth facing him.

HELL ON WHEELS BUILDING DESIGNATED GAFFEY HALL

Among the many guests at ceremonies designating Gaffey Hall to be the official name of the 2d Armored Division headquarters building were from left to right: Major General George G. Cantlay, Commanding General of the 2d Armored Division; and Mrs. Gaffey with her daughter, Mrs. David Ford. The building was named in honor of Major General Hugh J. Gaffey who commanded the division during World War II. General Gaffey was killed in an aircraft accident while serving as commandant of the Armor School at Fort Knox.

1/37 ARMOR INSTITUTES PROMOTION BY PERFORMANCE

Soldiers seeking promotion in the 1st Battalion, 37th Armor, 1st Armored Division are discovering that they must know their jobs thoroughly if they hope to stitch on another stripe. That unit has initiated a performance-oriented promotion board in lieu of the traditional formal board.

The new board consists of a written test pertaining to the man's job and general military subjects, followed by a compass course leading to five separate stations. At each station, the man is given either a practical application test or an oral quiz in first aid, CBR, weapon maintenance, vehicle maintenance, or mine detection. The course stretches over several miles, thus also testing the soldier's physical readiness.

FORT HOOD UNITS RESPOND TO MANAGUAN EARTHQUAKE DISASTER

Four *Chinook* helicopters from D Company, 227th Aviation Battalion, 1st Cavalry Division, together with support elements from III Corps, participated in the Army's assistance mission to earthquake-ravaged Managua, Nicaragua. The heavy lift helicopters moved over 300 tons of food and other supplies during the two-week mission.

The 21st Evacuation Hospital (Semi-Mobile) from III Corps was also airlifted to Managua. Their "hospital in tents" is to be the main medical facility in the city until the 1,000 bed general hospital is rebuilt.

MASTER'S DEGREE PROGRAM AT FORT KNOX

The University of Southern California (USC), in cooperation with the Educational Development Branch at Fort Knox, is offering an on-post, resident degree program leading to a Master of Science Degree in Systems Management. This program has been created by the

Systems Management Center at USC to educate decision and policy makers in the systems approach to management. First used in the aerospace industry, the systems approach has been widely accepted and integrated into the administration of business, industry, government and education.

The MS program in Systems Management is currently offered at Fort Knox and at over 30 other Graduate Study Centers located at military installations throughout the world. This global activity permits many students to begin the program at one location and to finish it at another. The program may be entered at any time since the courses are non-sequential. It should be noted that this is not an extension program but a resident program in which the degree is awarded by the USC Graduate School.

The curriculum is composed of ten core or required courses and two elective courses. Each course meets for eight weeks; two nights per week for three hours. All requirements for the degree (36 semester hours of credit and no thesis) may be satisfied through on-post classes within a two-year period.

MEDAL WORKING DIES PRESENTED TO PATTON MUSEUM

Mrs. Mary Brooks, Director of the US Mint, recently presented the working dies for a new medal depicting the US Bullion Depository to Armor School Assistant Commandant, Brigadier General George S. Patton. The dies will remain on display at the new Patton Museum where the medals will be sold for $1.25 each.

SERGEANTS MAJOR ACADEMY OPENS AT FORT BLISS

The US Army Sergeants Major Academy began operations at Fort Bliss on 12 January with the first class of 100 students—92 Regular Army personnel and eight members of the reserve components. The academy is designed to provide a comprehensive, professional educational environment within which selected noncommissioned officers can prepare to assume the duties of sergeants major.

Eligibility for the academy is limited to master sergeants or first sergeants with a minimum general test (GT) score of 100. Selection for the course is made by Department of the Army on the basis of demonstrated professionalism and personal character.

The curriculum is composed of 632 hours of instruction in five broad areas—human relations, world affairs, military organization and operation, military management, and electives.

334TH AVIATION COMPANY MOVES TO GERMANY

Members of the 334th Aviation Company (Attack Helicopter) await the unloading of their baggage upon arrival at Rhein Main Airport in Frankfurt, Germany. The 334th, formerly stationed at Fort Knox, is now stationed at Fliegerhorst Kaserne in Hanau.

MORE UNITS QUALIFY FOR ARMOR ASSOCIATION AWARD

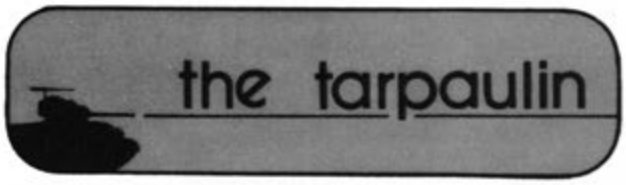
The following units have qualified for the Armor Association Unit Award. Listed with the unit designation is the commanding officer at the time of qualification.

1st Battalion, 13th Armor 1st Cavalry Division	**LTC John D. Borgman**
3d Squadron, 1st Cavalry 1st Cavalry Division	**LTC Alexander R. Macdonald**
1st Battalion, 54th Infantry 1st Armored Division	**LTC Gordon R. Ferris**
18th Battalion, 5th Training Brigade, US Army Training Center Armor	**LTC Archille O. Bourque**
19th Battalion, 5th Training Brigade, US Army Training Center Armor	**LTC Leonard L. Miller**
12th Battalion, 5th Training Brigade, US Army Training Center Armor	**LTC Thomas J. LeVasseur Jr.**
2d Squadron 11th Armored Cavalry Regiment	**LTC M. G. O'Connell**
4th Battalion, 69th Armor 8th Infantry Division	**LTC Dale K. Brudvig**
1st Battalion, 32d Armor 3d Armored Division	**LTC James C. Hattersley**

These units have qualified in addition to the nine units

noted in the November-December issue of *ARMOR*.

To be eligible for an award, all company/troop size units within a battalion/squadron authorized a unit fund must have a minimum of two unit fund subscriptions to *ARMOR* Magazine. Units qualifying receive a handsome laminated plaque.



Covers a bit of everything gleaned from the service press, information releases, etc. Contributions are earnestly sought.

TAKE COMMAND

COL William W. DeLoach, 1st Bde, 1st Cav Div . . . **COL Joseph N. Jaggers Jr,** 3d Bde, 1st Cav Div . . . **COL Henry R. Shelton,** 4th Bde, USATCA . . . **COL Lawrence S. Wright,** 1st Bde, 1st Cav Div . . . **LTC Gerald T. Bartlett,** 1st Sqdn, 4th Cav, 1st Inf Div . . . **LTC Charles J. Birt,** 2d Bn, 32d Armor, 3d Armd Div . . . **LTC Jack O. Bradshaw,** Arty, 2d Bn, 6th Arty, 1st Armd Div . . . **LTC Richard L. Elliott,** 3d Bn, 33d Armor, 3d Armd Div . . . **LTC Henri F. Erkelens,** 1st Bn, 68th Armor, 8th Inf Div . . . **LTC Lawrence Fitzmorris,** 1st Bn, 77th Armor, 4th Inf Div . . . **LTC F. Whitney Hall Jr,** 3d Sqdn, 2d ACR . . . **LTC John L. Schick,** 3d Bn, 1st Bde, USATCA . . . **LTC Raymond J. Trouve,** 4th Bn, 73d Armor, 1st Inf Div . . . **LTC Allen S. Wilder Jr,** 3d Sqdn, 11th ACR . . . **LTC James A. White,** Inf, 1st Bn, 6th Inf, 1st Armd Div . . . **MAJ Wilbur L. Beck Jr,** MC, 45th Med Bn, 3d Armd Div.

ASSIGNED

MG Herbert J. McChrystal, DCG, MASSTER . . . **MG James C. Smith,** DCG, Northern Reserve Forces, 5th Army, Ft Sheridan . . . **BG Clay T. Buckingham,** ADC, 1st Armd Div . . . **BG John C. Burney,** ADC, 9th Inf Div . . . **BG John C. Faith,** HQ, CONARC . . . **BG Vasco J. Feneli,** NSA, Ft Meade . . . **BG John L. Gerrity,** OSACEUR, SHAPE . . . **BG Rolland V. Heiser,** Dir of Plans, DCSOPS, DA . . . **BG Richard G. Trefry,** Dep Chief, JUSMAGTHAI . . . **COL Thomas D. Ayers,** CofS, 1st Cav Div . . . **COL John T. Price Jr,** HQ III Corps . . . **COL Thomas G. Quinn,** USAARMS . . . **COL Walter F. Ulmer Jr,** CofS, TRAC, MACV . . . **LTC Milton L. Aitken,** HQ CDC . . . **LTC Joseph B. Ameel,** XM1 Project, Wash, DC . . . **LTC Clayton Bachman,** USAARMS . . . **LTC Bobby Berryhill,** HQ 3d Army . . . **LTC Cheney L. Bertholf,** SOUTHCOM . . . **LTC Billy Biberstein,** JUSMAGTHAI . . . **LTC Philip D. Briggs,** HQ CONARC . . . **LTC Frederick J. Brown,** OCSA . . . **LTC James G. Campbell,** HQ CONARC . . . **LTC Leonard R. Casey,** C&S Dept, USAARMS . . . **LTC J. Elmer Collings,** JUSMMAT . . . **LTC Bruce E. Dahl,** USAARMS . . . **LTC Stanleigh K. Fisk,** IO, 4th Inf Div . . . **LTC William Greenberg,** HQ 4th RD, Ft Sam Houston . . . **LTC Aaron C. J. Harvey,** ROTC Reg Hq, Ft Knox . . . **LTC Robert T. Hatcher,** USAARMS . . . **LTC James H. Hetherly,** HQ 3d Army . . . **LTC Harry W. Johnson,** 1st Inf Div . . . **LTC James H. Jones,** 4th Inf Div . . . **LTC Donald T. Kemp,** HQ EUCOM (J7) . . . **LTC Charles L. Laakso,** ROTC Reg Hq, Ft Riley . . . **LTC Bernard M. Landau,** SGS, HQ USAREUR . . . **LTC Fred W. Lawley,** Mil Asst Ctr . . . **LTC Richard Lhommedieu,** Arctic Test Ctr . . . **LTC Robert D. Martin,** JUSMAGPHIL . . . **LTC Robert L. Maxham,** ROTC Reg Hq, Ft Knox . . . **LTC Thomas E. Mendel,** JUSMMAT . . . **LTC Edward W. Newell,** 1st Inf Div . . . **LTC John L. Olow III,** JUSMAG Korea . . . **LTC Charles R. Parker,** HQ EUCOM . . . **LTC Philemon Redman,** CDEC, Ft Ord . . . **LTC Richard Russell,** AFSOUTH, Verona . . . **LTC Don F. Snow,** USATC Inf, Ft Dix . . . **LTC John Undercoffer,** HQ 1st Army . . . **LTC Jack B. Wilkes,** PACOM . . . **LTC William Willette,** ROTC Reg Hq . . . **MAJ Charles Acree,** Test & Eval Agcy, Ft Belvoir . . . **MAJ Florencio Barrera,** MEDTC . . . **MAJ Gary D. Bergeron,** JUSMAGTHAI . . . **MAJ Perry T. Brasuell,** CDEC, Ft Ord . . . **MAJ Ralph P. Brown,** USAARMS . . . **MAJ Thomas J. Canavan,** HQ 3d Army . . . **MAJ Lawrence Dimichele,** USAARMS . . . **MAJ Victor L. Donnell,** USMA . . . **MAJ James A. Dutcher,** JUSMAGTHAI . . . **MAJ William J. Dwyer,** JAG Sch, Charlottesville . . . **MAJ James L. Farris,** Mil Asst Ctr . . . **MAJ Lazelle E. Free,** ROTC Reg HQ, Ft Knox . . . **MAJ Ernest L. Fulford,** 11th ACR . . . **MAJ John H. Getgood,** USAG, Ft Devens . . . **MAJ Sabin Gianelloni,** MEDTC . . . **MAJ John F. Glenn,** 3d ACR . . . **MAJ Kenneth Gregory,** ROTC Reg Hq, Ft Bragg . . . **MAJ Edward Halbert,** USARPAC . . . **MAJ George P. Hewlett,** HQ 3d Army . . . **MAJ James R. Joy,** RMS, Cornwall, NY . . . **MAJ David A. Kretschmar,** DDLP, USAARMS . . . **MAJ Sylvain M. Loupe,** CDEC, Ft Ord . . . **MAJ David Mace,** HQ 3d Army . . . **MAJ Ronald E. Mayhew,** USAARMS . . . **MAJ George P. Miller,** ACSFOR, DA . . . **MAJ Richard G. Miller,** HQ CONARC . . . **MAJ Benton D. Murdock,** C&S Dept, USAARMS . . . **MAJ Roger W. Sifrit,** MASSTER . . . **MAJ John E. Smith,** USAG (G3-DPT), Ft Campbell . . . **MAJ James L. Tedrick,** HQ CONARC . . . **MAJ Jimmy G. Tucker,** 2d Bde, 101st Abn Div . . . **MAJ Donald H. Volta,** HQ CONARC . . . **MAJ William F. Ward,** Karachi . . . **MAJ William A. West,** ROTC Reg Hq, Ft Bragg . . . **MAJ Daniel A. Willson,** USAARMS . . . **MAJ Bazel B. Winstead,** ROTC Reg Hq, Ft Knox . . . **CSM William S. Parker,** 4th Bn, 37th Armor, 194th Armd Bde, Ft Knox.

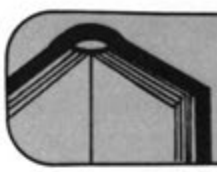
VICTORIOUS

Army Aviation's Broken Wing Award was presented to **CPT Luther Waller** of AOAC 73-1. The award cited his extraordinary skill, judgment and flying technique in averting a possibly tragic crash . . . **MAJ Patrick E. Riley** was recognized as an Honor Graduate of the Logistics Executive Development Course at Ft Lee . . . **2LT Timothy Lupfer** has been selected as a Rhodes Scholar at Oxford University . . . **PSG Gilbert Villa** has been named the outstanding drill sergeant of 1972 at Ft Knox . . . Military Wives of the Year named: Ft Bliss,

Mrs. Rosella Marie Slattery, wife of **1SG Robert C. Slattery** of **HHT, 1st Sqdn, 3d ACR;** 1st Cav Div and Fort Hood Military Wife of the Year is **Mrs. Barbara Schneider,** wife of **LTC William H. Schneider, 1st Bn, 77th Arty;** 2d Armd Div, **Mrs. Mary McConnell,** wife of **CWO 4 Russell V. McConnell,** 2d Armd Div, Bandmaster; Ft Campbell, **Mrs. Lonnie Williams,** wife of **MAJ David H. Williams;** AOAC 72-3 Distinguished Graduate was **CPT George T. Raach;** Honor Graduates were: **CPT William M. Jacqmein, CPT Charles E. Tompkins III, CPT Thomas E. Ramick** and **CPT William R. Kyzer** . . . AOB 3-73 Distinguished Graduate was **2LT Robert D. Engiles;** Honor Graduates were: **2LT Alan B. Whitager, 2LT Donald R. Reidel, 1LT Allan H. Wegner** and **2LT Lawrence D. Grable** . . . Distinguished Graduate of AOB 4-73 was **2LT Robert Block;** Honor Graduates were: **2LT Frederick T. Thurston, 2LT Jon L. Howell, 2LT Donald L. Michener, 2LT James Carr, 2LT John A. Cross,** USMC, and **2LT Joe W. Schoolcraft** . . . Distinguished Graduate of the first NCO Advanced Class at Ft Knox was **PSG Glen A. Harlow, Trp C, 1st Sqdn, 3d ACR;** Honor Graduates were: **SFC Donald C. Morgan, PSG Donlie B. McMullin, SFC James M. Thompson** and **SFC Mason J. Poe** . . . **SP4 Geary L. Luke, HHT, 1st Sqdn, 11th ACR** was named V Corps Soldier of the Quarter . . . **SSG Michael O'Connor, Co D, 6th Bn, 2d Bde, USATCA** has been named a "Kentucky Colonel" in recognition of his work as President of the West Point, Ky Jaycees . . . Two consecutive Trooper of the Month awards in the 1st Inf Div went to tankers of the **2d Bn, 63d Armor. SP4 Robert L. Edwards, Co C,** was named Trooper of the Month for August, and **SP4 James E. Wells,** also of **Co C** was named Trooper of the Month for Sep, as well as Trooper of the Quarter for the 1st Quarter, FY73.

AND SO FORTH

MG Gilbert H. Woodward has been designated to command the US delegation to the four-power joint military commission that will help supervise the Vietnam cease-fire . . . The **5th Recon Sqdn, 2d Bde, USATCA** has been inactivated. During seven years of training, 30,000 recon specialists passed through the squadron . . . The last active cavalry force in Europe has been given the go-ahead to give up its horses for tanks. The **3,000 Swiss Dragoons** have been ordered to make the transition to British-made **Centurion** tanks by the end of 1973 . . . The **1st Bn, 77th Armor, 4th Inf Div** has been activated at Ft Carson with **LTC Lawrence Fitzmorris** as the commander . . . The **1st Sqdn, 6th ACR** will move to Ft Bliss where it will become a part of the 3d ACR . . . The **10th Armd Div Assn** will hold its 22d Annual Reunion in Atlanta 31 Aug through 3 Sep. . . An **Army Operational Test and Evaluation Agency** has been established at Ft Belvoir as a part of ACSFOR. The new agency will plan, direct and evaluate operational testing on all major and certain nonmajor equipment systems for the Army. . . AR 670-5 is the authority for units to use appropriated funds for the **purchase of distinctive unit insignia** . . . **16th Armd Div Assn** will hold their annual reunion in Chattanooga 9-12 Aug . . . **GEN Bruce C. Clarke** has been named to the Douglas MacArthur Chair of Military Science at the US Army Engineer School. . . The **4th Armd Div Assn** will have its reunion at the Marriott Motor Hotel in Philadelphia 19-21 Jul. . . Exchange and Commissary store regulations are being changed to allow all **Medal of Honor recipients** and their dependents to use exchange facilities . . . **CWO Lester M. Whiteis Jr** has been awarded the 1972 Military Kitty Hawk Memorial Award by the Los Angeles Chamber of Commerce. . . The **11th Armd Div Assn** will have their 1973 convention at Chatham Center in Pittsburgh 15-18 Aug. . . **AFRTS** recently celebrated its 30th anniversary. . . Two more **beehive ammunition rounds** have been accepted by the Army for use on the **M48** and **M60** series tanks. . . The **1st Armd Div Assn** will hold its 26th Annual Reunion in Boston 17-20 Aug. . .**Alfred K. Lee** is the newly elected President of the **1st Armd Div Assn**. . . **Russell A. Steindam Hall** has been dedicated at the University of Texas honoring the memory of a graduate who was killed in Vietnam and was awarded the Medal of Honor posthumously. The former ROTC building was named in honor of **1LT Russell A Steindam, 3d Sqdn, 4th Cav, 25th Inf Div**. . . The **7th Armd Div Assn** will meet in St Louis 15-18 Aug. . . The 26th reunion of the **3d Armd Div Assn** will be in New Orleans 25-28 Jul. . . The **12th Armd Div Assn** will meet in San Francisco 16-18 Aug.



from the bookshelf

THE ALMANAC OF WORLD MILITARY POWER

by Colonel T.N. Dupuy (USA-Retired) and Colonel Wendell Blanchard (USA-Retired). R.R. Bowker Company. 370 pages. 1972. $22.50.

This is a reference work of the first order. The amount of information it contains is vast, covering military forces and their status in every country of the world. That information is organized with precision. The world is divided into ten regions by the authors. For each region, a survey is made of the military geography, strategic significance, regional alliances, and a chronology of recent conflicts involving countries within the area. Following regional surveys, each country's military power is examined. The aspects that are discussed include vital national statistics such as GNP, population and land area; defense structure, to include paramilitary forces; strategic problems; alliances; politico-military policy; and whether the country receives or gives military assistance.

The glossary alone is worth the cost of the book. It includes the official numerical or class designations, the coqnomen and nicknames of most of the world's military weapons. The glossary also points out the difference between units of the identical name (battalion, division, etc.) used for units of varying size in different armies, such as the difference between a squadron in the American and British armies.

There are some shortcomings to this volume. Military power cannot be measured without consideration of the country's economic status in terms of critical raw materials or natural resources. These economic factors are not included in this discussion of power. Military organizations are very dynamic and because of this, it will not be long before the book will be out of date. The black and white maps included for each country are difficult to read and it would have been worth the extra cost to have the maps in color. Two nitpicks regarding the discussion of the American military: the glossary fails to mention that the term regiment is still used by the US Armored Cavalry; and the discussion of US defense structure incorrectly states the US has two airborne divisions, thus ignoring the fact that the 101st is actually an airmobile division.

Overall, it's a very good book. It is an accurate reference that can be invaluable to the professional diplomatic or military planner. A personal copy of this book can save the student at service schools many hours of research time.

Lieutenant Colonel Carl M. Putnam
Army War College

GEHLEN: Spy of the Century

by E. H. Cookridge. Random House. 402 pages. 1972. $10.00.

No one really knows who was or is the spy of the century. Cookridge makes quite a case for the candidacy of Reinhard Gehlen. Even to the uninitiated, this is a great yarn of plot, counterplot and exquisite one-upsmanship in the area of international intrigue. Gehlen is a figure perfectly suited to the task. An upper-middle-class Prussian, he possesses a cold, calculating, bright mind conditioned early in life to regard the Russian Bolshevist as a menace to (his) mankind.

Gehlen's entire life appears to have been dominated by two passions—to destroy socialism and to preserve and advance his own ambitions. His anonymous dedication under three bosses (Hitler, CIA, the FRG) in pursuit of the second is recorded in this book in a fascinating fashion.

Gehlen is a true professional who provided continuous high quality intelligence about the Soviets and their Allies. The Soviet archives produced before and during World War II were priceless and served as the ransom to eventually win him full support from the US in 1946. From then until his retirement in 1968, his "Gehlen Organization," located deep in Bavaria, continued to work against the Soviets in countless devious ways. Gehlen enlisted the personal secretary of East German Prime Minister Otto Grotewohle. He warned the West, beforehand, of the Berlin and Budapest revolts. He predicted the Soviet suppression of Czech Leader Dubeck. He landed an official copy of Khruschev's Stalin speech before any other. He successfully tapped into the Soviet/East Berlin phone system for months.

The author has constructed a fascinating account of a little known area of the Cold War, disclosing his own biases and not a few errors, in the process. He persisted in using nazi, always as an adjective, with a small case n. Cookridge repeatedly slams Gehlen's recent memoirs for their "paucity of detail and total absence of documentation." As an author, with some intelligence background during World War II, perhaps he envied the $1,000,000 Gehlen is reputed to have gotten for his literary efforts.

Cookridge commits some glaring errors to paper. General W. Bedell Smith is noted as the "only American four-star general who had not graduated from West Point and the War Academy;" thus relegating George Marshall, and others, to total ignominity. He carefully documents Gehlen's two post-war trips to the States (1945 to bargain over his future; 1957 for JCS support to become NATO Intelligence Chief) only to destroy these by calling a trip back to the States in 1959, for nonsensical reasons, "Gehlen's only journey abroad after the war."

There are others. Cookridge is poor with dates. You must do your own reconstruction as he wanders back and forth in relating an event. But, just as he accorded faint praise to his subject, the author is due more than grudging admiration for the assembly of this great amount of detail about the extraordinary Cold War activity that makes few headlines.

Colonel Clyde H. Patterson, Jr.
DCSOPS, USAREUR

THE DOUBLE-CROSS SYSTEM In The War of 1939 to 1945.

by J.C. Masterman. Yale University Press. 203 Pages. 1972. $6.95.

The conflict in Europe during the 1940s has provided the background for a number of spy thrillers, many completely fictional and many based on fact. In *The Double-Cross System,* we are exposed to nothing less than a published version of a top secret intelligence report, only recently released to the public. Included in this brief book are, in fact, the bare

bones of any number of spy stories, needing only fleshing out by accomplished authors to flood the market.

The Double-Cross System is the amazing story of how the British were able to take over the entire German spy network in England throughout World War II. From its inception before the war through its expansion during the war years, the entire system is explained to the reader. The author has combined a discussion of theory and principle, a disclosure of the operation of the supervisory structure, and the stories of individual agents in a pattern that provides a broad understanding of the entire operation.

If the book can be faulted, it is because the author has tried to do too much in too few words. The parade of spys to which the reader is exposed leaves him somewhat confused about the role played by each. Similarly, the reader is left with the feeling that the committee controlling the system could have been explained in greater depth. The general impression is that this inherently fascinating story could have been made even more so.

Author Masterman has done a highly commendable job of reporting one of the greatest spy stories of all time; a book well worth reading.

Colonel Philip L. Bolte
Army War College

NEW ERA IN THE PACIFIC: An Adventure in Public Diplomacy
by John Hohenberg. Simon and Schuster. 539 pages. 1972. $11.95.

This book is an interesting and provocative account of one man's adventure in public diplomacy. John Hohenberg, Asian specialist and Professor of Journalism at Columbia University, spent three years traveling and interviewing in what he calls the Indo-Pacific area. He includes in this geographical expression, India, Pakistan, Bangladesh, Ceylon, Indonesia, plus Burma and the littoral states of the Pacific, as well as Taiwan and the Philippines. There is no separate treatment of the USSR as a Pacific power, but Russian influence is noted where it has an important bearing on the Indo-Pacific nations.

The author's theme is that a new American policy of peace and cooperation in the Indo-Pacific area is urgently needed. He has little regard for the post-World War II strategy in the area which eventually led to the Vietnam situation that has so divided the American public over the past few years. He believes the old US foreign policy is bankrupt and desperately needs reformulation to meet the challenges of the last quarter of the 20th Century. Military intervention and foreign bases with alliances which bind the US to shaky and corrupt petty dictators must be terminated. However, he is not for retreating into a "Fortress America," but rather hopes that the US can develop multi-national approaches to economic, social and ecological problems which will help the developing nations improve their lot.

He recognizes that trade and balance of payments between Japan and the US can affect the world of the future far more than most people are aware. The author believes that economic and social world problems will be more important than security questions in the future, requiring a new approach in defining national interests for the US.

Although the author acknowledges by name most of his sources, there are some viewpoints expressed by individuals who remain anonymous. Since these expressions are often diametrically opposed to the official, national policy of a country, something is definitely lost in making an assessment of the importance of the controversial opinion. Another specific detail which might have been improved in tying together the interrelationships of great power policies was the author's failure to indicate the sequence of events in the Sino-Soviet problem that led from the Russian intervention in Czechoslovakia in 1968, to the enunciation of the Brezhnev doctrine, to the Russian military build-up on the Sino-Soviet border, to the armed clashes along the Ussuri River, and finally to the reception of President Nixon in Peking.

This book is well worth reading, both for its balanced presentation of the problems of the Indo-Pacific area as well as for the provocative suggestions for developing a new US foreign policy for the area.

Dr. Charles S. Hall
Army War College

DEAR ISRAELIS, DEAR ARABS
by Roger Fisher. Harper & Row. 166 pages. 1972. $6.95.

This interesting and practical book deals with the problem of finding a solution to the long-standing Arab-Israeli dispute. The author, in addition to being a professor of law at the Harvard Law School, a former practicing attorney and government official, has also traveled widely in the Middle East and talked to prominent persons in the nations he visited. This book attempts to combine in a real way a theoretical approach with the hard drawn-out facts which history has bequeathed to the Arab-Israeli embroglio. While some readers are prone to scoff at theory, like idealism, as impractical, theory remains the central thread of hope and human progress. The author's approach then is to persevere on this reasonable approach to all governments, Arab and Israeli alike, to quickly diffuse and bring into manageable focus this long-standing dispute which continues to threaten the stability of the Middle East and the world.

The author assumes that the reader has a knowledge of the geographic, political, social and economic factors of the Middle East and focuses on the roles for law in conflict resolution. He is deliberately trying "to develop some theory derived from practice and apply that theory to practice" through a series of letters he has written to individual governmental officials in Jordan, Egypt and Israel among others. In each case, he attempts to suggest practical yet very pertinent solutions to the overall problem each country could and should take.

The author poses some interesting, thought-provoking statements such as "Israel is more interested in security than in territorial expansion." While this concept is very debatable to many readers, it remains a point of departure in his overall scheme of an operational approach to the entire problem which consists of breaking it up into pieces which in turn can then be negotiated separately and, conceivably, simultaneously. From the viewpoint of the United States, for example, as the prime peacemaker, one official could be charged with handling the opening of the Suez Canal, another charged with promoting a settlement on the West Bank, and yet another for solving the issue of Jerusalem. The same procedure would be followed by the Soviet Union, and the moves of these two superpowers so interested in the Middle East might even be made known to each other in advance in a sincere effort to reduce the "perception of hostility" as the author so adroitly puts it.

Above all, Professor Fisher offers his technique as a meaningful prop in support of Security Council Resolution 242.

All in all, a "must" book for all students and friends of the Middle East.

Colonel John O. Batiste
Army War College

THE POLITICS OF HEROIN IN SOUTHEAST ASIA

by Alfred W. McCoy with Cathleen B. Read and Leonard P. Adams II. Harper & Row. 464 pages. 1972. $10.95.

"The logistics of heroin—the most profitable criminal enterprise known to man—an enterprise that involves millions of peasant farmers in the mountains of Asia, thousands of corrupt government officials, disciplined criminal syndicates and agencies of the United States government." Thus, the author describes the illicit traffic in heroin. In a well documented dissertation, McCoy cites the current impact of heroin on this country, traces the history and development of the heroin phenomenon, describes underworld activities involving international heroin traffic, and finally renders an in-depth discussion of opium and heroin production and marketing in Southeast Asia. Virtually no aspects of this problem are untouched. Although he is periodically redundant and belabors some points, one gains the impression he has done his homework; the work seems sound and comprehensive. The book is heavily footnoted, almost to the point of distraction; nonetheless, the detail of names, places, dates and events is impressive.

He describes the Golden Triangle of Southeast Asia, Northeastern Burma, and Northern Thailand and Laos, as the primary opium growing and processing region in Southeast Asia; he outlines the growing and trafficking activities of highland tribesmen, warlords, guerrillas and the overall operational control by high-ranking officials of the three countries. He then describes a distribution system that ultimately leads to servicemen in Vietnam and the streets of the United States. He implies that US involvement in that area of the world led this country into the narcotics traffic. He asserts that, "American diplomats and secret agents have been involved in the narcotics traffic at three levels: (1) Coincidental complicity by allying with groups actively engaged in the drug traffic; (2) abetting the traffic by covering up for known heroin traffickers; and (3) active engagement in the traffic of opium and heroin." Additionally, he contends that the CIA was deeply involved in the opium and heroin traffic to the extent that some of the Agency's operatives and clients controlled it and that Air America aircraft were used for transportation.

The supporting evidence given for these and other allegations and assertions in the book is weak and ultimately does little justice to an otherwise acceptable book. The author also seems to be of the opinion that certain American officials serving in Southeast Asia in various capacities are automatically privy to all the machinations of a highly secretive, complex and camouflaged operation, and that armed with this knowledge they should do something about it. A final weakness of the book is McCoy's simplistic definition and solution to cure heroin addiction, that being to end opium production and the growing of poppies. This just doesn't face up to the realities of an enormously complex situation.

The reader of this book would do well to also read a statement of General Lewis W. Walt pertaining to world drug traffic and its impact on US Security, given before the Senate Subcommittee to Investigate the Administration of the Internal Security Act and Other Internal Security Laws.

In part, General Walt states:

> The Southeast Asian drug situation must be dealt with on a regional basis. As I see it, there are five factors which contribute to the making of this situation:
>
> The principal factor in the entire situation is the virtually total absence of any kind of governmental authority or machinery of control and repression in northern Burma, which is the heartland of the Southeast Asian drug situation.
>
> The second most important factor is the criminal element in Southeast Asia, largely dominated by ethnic Chinese, operating in a Mafia-like manner through the old tongs, or Triad societies.
>
> The third factor is the serious lack of experienced personnel and technological equipment, and of an established control apparatus which still hampers the efforts of the Southeast Asian governments.
>
> The fourth factor, in my opinion, is the element of Communist involvement—in Laos, in Thailand, in Burma and probably in Vietnam.
>
> The fifth factor is corruption.
>
> Looking at it from this standpoint, it is nonsense to suggest that the prime factor contributing to the drug problem in Southeast Asia is the existence of widespread governmental corruption.
>
> Given the existence of the other four factors, there would still be a serious drug problem in Southeast Asia regardless of any corruption that might exist in any government.
>
> There may be honest differences of opinion over whether corruption should be ranked ahead of the Communist factor or ahead of the lack of personnel and equipment. But I believe that no one can challenge the assertion that the Burma factor ranks first and the criminal factor ranks second in the Southeast Asia drug equation. Anyone who ignores these factors is simply not looking at the situation objectively or as a whole.

General Walt touches on many of the same events, personalities and areas addressed by Mr. McCoy, but reaches an entirely different set of conclusions; perhaps reality lies somewhere in between.

Lieutenant Colonel James M. Krebs
Alcohol & Drug Policies Division
DCSPER

ELECTIONS FOR SALE

by Max McCarthy. Houghton Mifflin Company. 192 pages. 1972. $5.95.

"The price tag for just two political offices—the governorship in Albany and one of New York's two US Senate seats—came to more than $20 million in 1970." This quotation sets the theme for this book by Max McCarthy, former Congressman from New York's 39th Congressional District, who was often described by his colleagues as the conscience of the House of Representatives. There could be no more appropriate time for this book than a national presidential election year.

Mr. McCarthy has assembled detailed information describing to a disturbing degree the extent to which candidates for elections are being subsidized by special interest groups and large individual donors. He postulates that the campaign costs of an election have reached such a level that a candidate must possess a personal fortune which he is willing to spend or be willing to place

himself in a compromising position in return for financial support. He predicts that congressional and gubernatorial elections may result in men who are not their own masters.

His inclusion of detailed statistics on past elections, to include presidential elections, casts a pall over this democratic process and the free expression of the electorate. In his review of the current laws regarding public declaration of campaign contributions, he cites the singular lack of interest by the Justice Department in prosecuting what could be considered flagrant disregard for the laws of the land.

The discussion of the methods used in other nations of the world, such as the United Kingdom, France, Sweden and the Federal Republic of Germany, to finance elections is informative; but their direct relationship to the US is unfortunately left rather vague. He concludes that support for the financing of political processes seems to be relatively universal and is dictated by the feeling that public faith and confidence in the basic honesty of our democratic political system must be reinforced.

He concludes his book with an analysis of the current laws and suggested program for reform. A disturbing yet informative book, it highlights a program of corrective actions which are required to strengthen a key pillar of our American way of life, the free election.

It is unfortunate that at times Mr. McCarthy lets his Democratic Party affiliation shine through in his severe criticism of Republican candidates, to include President Nixon. The inference is that certain Republican candidates are as a result "in the pocket of special interest groups." Despite this occasional lapse of objectivity, he makes a telling case for full support of a system of public financing of election campaigns. Perhaps in its fullest interpretation a utopian dream and one which the realists will say is only to bail the Democratic Party out of its current financial hole, it is still a program Americans can and should support.

Colonel R.E. Dingeman
Army War College

THE PETER PRESCRIPTION
by Dr. Laurence J. Peter. William Morrow and Company, Inc. 224 pages. 1972. $5.95.

By now, just about everyone is familiar with the 1969 bestseller on organizational incompetence, *The Peter Principle*. It was a most delightful little book which pointed out what most of us had long suspected—that the majority of our coworkers were incompetent. Simply stated, the Peter Principle said that: "In a hierarchy every employee tends to rise to his level of incompetence." Or to paraphrase it with Peter's Corollary, "In time, every post tends to be occupied by an employee who is incompetent to carry out his duties." The book sought to prove the validity of this principle through a lively discussion of a varied fare of case studies. Specific attention was paid to those situations which appeared, at least superficially, to be exceptions to the "Peter Principle." In the end, however, the universality of the principle was firmly maintained.

The same man who gave us *The Peter Principle* has returned, to demonstrate that he has yet to reach his "level of incompetence." Dr. Laurence J. Peter's latest aid for the budding bureaucrat is his new book entitled *The Peter Prescription*. In it, Dr. Peter continues in the same refreshing, entertaining and informative style that made his first book so popular. This time, however, instead of explaining why things are always going wrong, a positive plan is presented for making things go right. The plan is a series of sixty-six prescriptions ranging from The Peter Preparation: revitalize your body; through The Peter Pimpernel: be your own hero; through The Peter Potency: have the courage to act; to The Peter Purpose: motivate and reinforce employees by accurately communicating what they are to achieve and provide feedback that communicates how well they are achieving that objective. Each of the prescriptions is provided with the necessary implementing instructions and the general benefits you can hope to realize from its use.

The book is not only amusing and, as such, easy to read, but it is also enlightening and, as such, needs to be read. Dr. Peter has written about a very serious contemporary problem—the tendency of the organization, instead of being society's obedient servant, of becoming its master. The very organizations that man created to assist him and make his life more enjoyable are now threatening to control him. It is obvious that there must be an integration of the individual and the organization, if either is to survive and flourish.

In an address before the Industrial College of the Armed Forces, Dr. Peter F. Drucker, a leading organizational scholar, concluded his remarks in part:

> Since change is now pervasive, continuous and permanent, we can no longer depend on the organization, as your predecessors did, to operate effectively. The Military Establishment which they built between 1940 and, say, the mid-1960s was and is a remarkable achievement. For a long time, it carried the executives who ran it. Sure they had to be good, but the parameters were set. That day has passed. You will have to carry yourselves. You will have to think through the problems and solve them. The organization won't do it for you.

The Peter Prescription can help members of the military meet the challenge that Dr. Drucker has posed. It contains a quite realistic plan for the attainment of individual and organizational detente presented in a very entertaining format. All in all, it would seem to be exactly what the doctor ordered and what the patient needs.

Captain Terry A. Girdon
1st Armored Division

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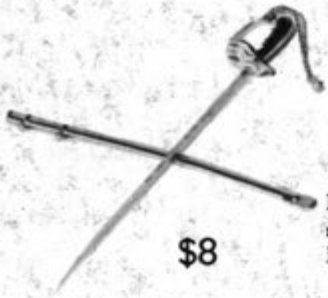

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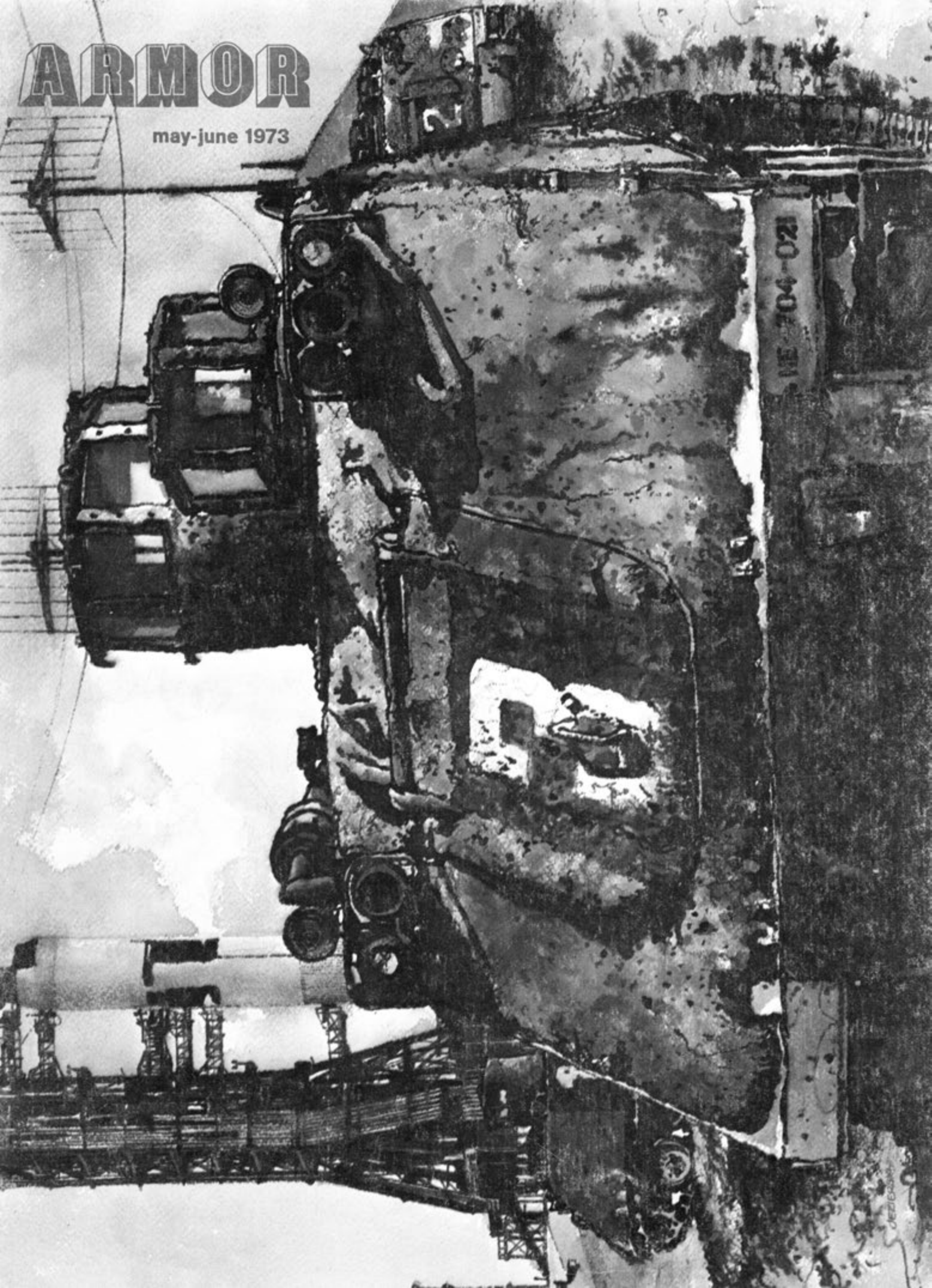

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the Magazine of Mobile Warfare

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ON THE COVER . . .

Artist Chet Jezierski's brush has captured the strange-looking vehicles used to accomplish Armor's unique role in the US Manned Space Program.

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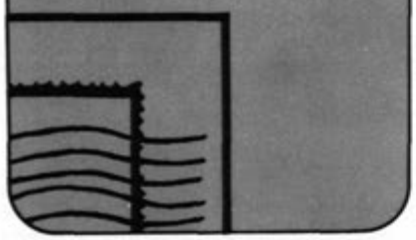
letters to the editor



Mission and Men Both Command Responsibilities

Dear Sir:

Captain Shaler's article in the January-February issue of *ARMOR*, "Mission and Men—Both are Essential," postulated a dichotomy of commandership as if the accomplishment of the mission and the welfare of the men were mutually exclusive. He maintains that "a single individual can rarely display behaviors along both dimensions" and, therefore, we should classify officers according to their expertise in one of the dimensions. Subsequently, we would look to personnel management to insure that both dimensions are found in all units. Few would disagree that both dimensions are necessary (along with countless others) in every unit. However, "specializing" is not only the wrong answer, but it avoids the very challenge posed by General Bruce Palmer (and quoted by Captain Shaler) of: ". . . broadening the perspective, intellectual grasp and technical resourcefulness of the leader." Indeed, specializing is a short-sighted approach to solving the problem.

Just as a positive approach to mission accomplishment should be ingrained in every officer, and is definitely learned, an equally positive approach in dealing with the individual and his needs can also be learned. I cannot accept the idea that the majority of our officers have a capacity for only one of the dimensions set forth by Captain Shaler. We can, indeed must, provide the foundation for each dimension in both our formal military education and field application. If an officer demonstrates that he is incapable of working in both dimensions, it should be so noted and he should be denied the privilege of command. This can be determined very adequately at the company command stage. Many commanders demand that their "second in command" actually contrast with them (similar to the duality offered by Captain Shaler). However, there are obvious limitations to this.

The commander bears the weight of decision making; it is he who allocates resources, distributes work and is the ultimate arbiter of conflict. He may or may not act on the advise of subordinates. Thus, it is essential that he have the fundamental ability to perceive problems and translate sound alternatives into workable programs within the unit. In my view, dividing expertise to conquer the ills of commandership simply isn't appropriate and would admit to a quality deficiency that I do not believe is common among officers.

The new initiative in command selection will alleviate much of the problem. The problem can be further solved by having all command selectees attend the Senior Commanders Orientation Course (SCOC), being offered at the Armor School and at other service schools. Individuals selected for battalion/brigade command have clearly demonstrated tremendous potential and mission orientation. The SCOC brings them up-to-date on the sociological problems of the military community and the "pulse" of the individual. The combination of selection and education is tremendous and offers each of us a standing challenge: "Be the kind of quality officer that is good enough for COMMAND!"

JOSEPH E. DREW JR.
Major, Armor
Fort Knox, Kentucky 40121

M60A2 Defended

Dear Sir:

Congratulations to Captain John Garlinger on his fine defense of the *M60A2* (*ARMOR*, March-April 1973). He is right and people should take notice. *We have it* and we must make the best possible use of it. As one who is also deeply involved in the *M60A2* ICTT, I feel that it is the type of attitude demonstrated by this captain which will make things happen.

I, for one, am delighted that he is assigned to the ICTT tank battalion.

GEORGE S. PATTON
Brigadier General, USA
Fort Knox, Kentucky 40121

A New Tank Needed

Dear Sir:

As I understand the articles I have read in your magazine, it seems to me that everyone is enthusiastic about the *M60A2* and its possibilities with the *Shillelagh* missile system, however it is an obvious fact that we cannot improve on the *M60* forever. If we continue to try to do this, I'm afraid we'll find ourselves in a position similar to that we faced in World War II with the *M4 Sherman*. During the tank battles in Europe, the *M4* proved quite inferior to the German *Tiger* and *Panther* tanks. I am afraid this is what will happen with the *M60* series tanks if they have to fight a pitched battle with tanks of such quality as the *Chieftain*, *Leopard* or *T62*.

We owe our tankers more than just a revamped version of the *M60*. It is time for Americans to wake up and decide that the lives of their young men are more important than the money needed for a tank of such quality as the *XM803*..

KURT A. AHLE
(Age 15)
Hazelwood, Missouri 63042

More On Advanced Main Battle Tank

Dear Sir:

I must confess to being somewhat confused by the article, "Advanced Main Battle Tank," by Captain O'Neill in the November-December issue of *ARMOR*. If armor is not to oppose enemy armor, nor directly support infantry, what then is to be its role? Experience over the past three decades has shown that the primary target of the tank is going to be an enemy tank—and that when enemy armor does not offer a target, the mission becomes one of direct support. Given a new tactical doctrine, what of the analysis that shows that the majority of targets in Western Europe would be tanks? Presumably these would somehow be shouldered aside and left for specialized antitank weapons . . . just as they were in World War II, with, I suspect, much the same result.

Captain O'Neill is fond of the idea of using masses of high mortality tanks. Again, I am confused, for is not the basic concept of armor one of economy of force? Given the probable manpower levels, how are the men to be found to crew this swarm of vehicles, and worse yet, for support? This aside, the loss of trained and experienced crews is not easily afforded. It would seem that the next generation of battle tanks should offer a better probability of crew survival, and if possible, a reduction in crew size.

Captain O'Neill is entranced by the idea of reducing the weight of the battle tank, thus increasing mobility and, in turn, hopefully increasing chances of survival. Today's tank guns have trouble hitting moving targets and therefore, increasing cross-country speed seems worthwhile. Top cross-country speed depends on the amount of ground contact area, power available at the sprocket, suspension response, crew sensitivity to vibration and driver visibility. With our knowledge of suspension systems and the availability of high specific output engines, a 50-ton tank is going to be just as fast across country as a 30-ton tank.

It may be argued that a lighter tank will be more mobile under marginal conditions. Such mobility depends on more than simple

nominal ground pressure; effects such as low-end engine torque, track shape, load distribution, steering and soil characteristics must be taken into account. If this is done, the advantage of the lighter vehicle becomes much less marked. In support of this, note that the "product-improved *Tiger II*," the *M60*, has virtually the same mobility as the *T62*; and that the *M60A2*'s nominal ground pressure is within 0.3psi of the lowest ground pressure of any current main battle tank. The bridging techniques and route surveys for a tank in the 50-ton class already exist, while anything less than a really drastic weight reduction—say to the 20-ton class—is not going to reduce the number of sorties required to airlift an armored force.

I am puzzled by Captain O'Neill's assertion on the lack of virtue of armor. Experience with lightly armored vehicles has shown that they must advance very slowly under hostile fire, and that there is a class of weapons which the heavily protected tank can ignore, while the light vehicle is stopped cold. In the current situation, we must not only consider the 23mm gun, but the existence of a very broad range of antitank weapons. Conventional antitank guns in the 57 to 100mm class, artillery rocket weapons, mines, various sorts of scatter munitions and the increased penetration of fragmentation shells demand a much higher level of protection than Captain O'Neill suggests. Thanks to the use of new armor concepts it is not only possible to provide this level of protection, but to also have a significant level of immunity to high-performance antitank weapons without a serious weight penalty. Consider the *Leopard*, which began as a tank very similar to the one Captain O'Neill wants, soon added enough armor to protect against the weapons mentioned above, and now, in the *Leopard II*, has been provided with enough armor to withstand heavy tank gun fire. This in an army which views heavy and expensive tanks with distaste, and as a bad battlefield risk.

Finally, consider the rather short shrift given the current tank gun in Captain O'Neill's article. Any really modern tank gun is going to have to offer much better lethality than any of today's, in view of the increases in protection that are being made. Similarly, increased speed and a decrease in target size means a requirement for a higher hit probability, especially in view of the need to conserve ammunition. Solutions regarding loading and firing on the move are also necessary. The reason for the large and complex tank gun, as seen in the *XM803* and the *M60A2*, becomes clear when viewed in the light of the above needs. First and last, the tank is a mobile weapons platform and must be evaluated in this light.

All the above is not to say that 80-ton dinosaurs with 200mm guns and 20-inch armor are needed. Rather, we need to see that the tank got where it is by a process of evolution, and that without breakthroughs in configuration and armament, it is going to be very difficult to improve. The knowledge to do this has been demonstrated, what we need is the willingness to apply it. Otherwise, it may be discovered that a cheap tank is an easy way to lose an expensive war.

DANIEL VUKOBRATOVICH
Tucson, Arizona 85719

Heavy Machine Gun Needs New Ammunitions

Dear Sir:

According to Lieutenant Colonel Sullivan (*ARMOR*, January-February 1973), and the developers responsible for the *Bushmaster*, the .50 caliber heavy machine gun is obsolete. It is no longer able to penetrate light armor at an adequate range, and it has no area burst effect. However, the .50 caliber will be in use in the armies of the Free World for many years to come, and by US forces at least until the adoption of the *Bushmaster* and probably for some time after. Therefore, the .50 caliber needs to have its effectiveness improved to the point that it is accepted again as a truly useful weapon.

A major change in the caliber, cartridge case, or breech pressure would require a redesign of the weapon, which would be as costly and complicated as the adoption of an entirely new weapon. What is needed is an improvement which will increase the effectiveness of the machine gun without any modification of the weapon.

A new improved series of ammunition will put new life into the old weapon. The new series would have the same cartridge case and projectile diameter as the current ammunition, and it must be limited to the recoil forces and pressures similar to the ammunition now in use. The new cartridge, however, must develop better performance.

Two new types of ammunition are needed, of which a new armor piercing round is of primary concern. This could be a conventional type AP round with an improved penetration core, similar to the AP round developed in the Netherlands. This improved round has penetration similar to the 20mm AP against standard APC hulls out to a range of 800 meters, which is vastly superior to the *KPV* 14.5mm. Armor penetration could be improved even more with the development of an APDS round. The improved AP ammunition alone would mean a tremendous improvement in the effectiveness of the .50 caliber.

The second type of ammunition needed is an explosive shell, which would improve the weapon's effectiveness against soft-skinned vehicles and aircraft. A high explosive round was considered during World War II, but rejected because its small size was deemed ineffective. However, increases in explosives technology and fuse miniaturization may have changed this situation. A .50 caliber projectile based on the HEP round may be powerful enough to be useful against trucks, personnel and other soft-skinned targets.

Both the AP and HE rounds must have tracer versions and the HE round should be ballistically matched to the present series of APIT, Ball and Tracer, to enable it to be used interchangeably in a combat mix. The Netherlands .50 caliber armor piercing hard core (APHC) is already matched to the current series of ammunition.

The development of these new types of ammunition could well extend the life of the "Big Fifty, Tanker's Friend" into the 1980s.

ALFRED T. BOWEN
Captain, Armor
2d Armored Cavalry Regiment
APO New York 09093

Army Aviation A Branch Skill

Dear Sir:

Captain Decoteau's letter (*ARMOR*, March-April 1973) advocating the recognition of aviation as an OPMS special career program is interesting and certainly shows a good deal of thought and interest on his part. It is quite healthy for the officer corps to consider such a challenge of policy from its junior members. His arguments seem sound, and many agree with his position; however, I personally disagree.

The central argument is whether aviation is an end in itself or a tool to be used to accomplish the Army mission. The favorable reputation Army Aviation enjoys today evolved as aviators proved that their special skill was closely related to accomplishing the primary missions of established branches. Being an aviator is little more than being a school-trained communications or maintenance officer in relation to the officer's basic branch. On the other hand, OPMS requires a secondary specialty in a field that is not related to qualification in the branch primary specialty.

A quick review of the last 25 years should help clear the air. In 1947, the largest group that believed aviation was an end in itself left the Army to form the United States Air Force. Many of the liaison pilots who stayed in the Army felt a need for a separate Aviator Branch.

By 1955, it became evident to the Army that a great many of these professional pilots were so specialized in flying that they could not satisfactorily perform their other responsibilities as Army Officers. The Army initiated a senior officer flight training program which enabled the Army to fill its key command and staff positions with capable officers. The whole philosophy of Army Aviation changed as these old soldiers, now new aviators, recognized aviation for what it is—a tool for accomplishing the ground combat mission. In Vietnam, following this concept, Army Aviation established the aforementioned good reputation. This success

also highlighted the need for total integration of aviation into existing branches—both organizationally and doctrinally.

This brings us to another point in Captain Decoteau's letter, which commented on the extra on-the-job training necessary for aviation staff officers. In fact, there is no requirement for extra training, since staff procedures at all levels remain pretty much the same. I predict that separate aviation staffs will disappear in the same manner as the separate Armor and Airborne staffs of yesteryear. This prediction is based on the complete familiarity that ground commanders gained from everyday use of aviation in Vietnam. The need for extensive and detailed advise on aviation employment has decreased, now that the use of aviation is a normal procedure. Many headquarters have already eliminated aviation staff sections and have incorporated aviators into other staff sections.

The next logical step in totally integrating aviation into existing branches was the assignment of proponency for aviation units to the appropriate branch, based on the relationship of primary missions. While the 1970 Chief of Staff decision has not yet been fully implemented, it was a sound move and a concept which Armor Branch pioneered much earlier with its air cavalry units.

Finally, it would appear that an OPMS specialty would have to be self-sustaining in grade structure. Aviation would not be, when separated from Armor specialty. A cursory review of the other specialty fields seems to confirm that premise.

My observations and experiences over the past 18 years as an Armor aviator have been pleasant because I competed with other Armor officers and not other aviators. I cannot see any advantage now in being separated by having aviation treated as a non-related specialty. On the other hand, both the individual and the Army can gain by having both an Armor and a non-related specialty. I have chosen mine and look forward to the new challenge.

CARL M. PUTNAM
Lieutenant Colonel, Armor
Army War College
Carlisle Barracks, Pennsylvania 17013

Dear Sir:

In reference to Captain Decoteau's letter which appeared in the March-April issue concerning aviation as a secondary skill, it is extremely difficult for my biased, non-rated mind to appreciate the plight of my rated brethren. Surely the flight pay must do something to assuage their mortally wounded pride. Is aviation a secondary skill? Perhaps, but only when other secondary skills are rewarded at a level equivalent to flight pay can I possibly sympathize with the aviators' dilemma. I am sure most aviators earn their flight pay, but the monetary compensation resulting from this activity certainly sets it apart from what could more properly be termed secondary skills.

MICHAEL P. PETERS
Captain, Armor
Seattle, Washington 98105

Advice to Advisors

Dear Sir:

I found Brigadier General Bowen's article, "The Art of Advisorship" in the September-October issue of *ARMOR*, very interesting. It brought to mind my involvement in the advisory field, and I thought the following "Advice to Advisors" might be of interest. Although it is more applicable to advisory duty in a noncombat situation, its philosophy can be applied worldwide. It was published 24 years ago in South Korea at the initiation of the Korean Military Assistance Advisory Group.

> Duty as an advisor in a foreign country is probably one of the more demanding jobs, excluding actual combat, in the military service. This statement applies regardless of rank, to either officer or NCO. An advisor is generally on his own, he probably works under less supervision than most military personnel, yet so much depends on how well he does his job; and we are not talking at this point of the passing out of materiel grant aid, but rather of the giving of himself and his knowledge; in other words, a salesman.
>
> An old saying goes, "in order to sell a product a salesman must first sell himself." This is certainly true in the advisory effort. An advisor must first show that he honestly wants to help, that he is understanding and patient. Understanding that the host country's military does not have, generally speaking, the background and training that he has, nor in most cases, the facilities available to him. Patience in realizing that the host country's military is deeply concerned with tradition and that perhaps what is being sold is a completely new and different thing to him.
>
> Once the "salesman" has sold himself he can concentrate on the product—US mission objectives. Our job is not only to improve the host's armed forces, but to do this spending as little of the US dollar as possible, and at the same time, influence the host country's armed forces as much as possible to take its proper place within the framework of a democratic society.
>
> The road to successful advisory duty is long and rough and full of many pitfalls, but at the end of the road is a feeling of having done a job well, of having contributed something to our cause, and of lasting friendships between military people of friendly countries.
>
> Our short experience in the military advisory field has shown us some of these pitfalls. Be careful of them!
>
> • Don't be "superior" to the personnel of the armed forces of the host country. You actually may not be. No one likes to be talked down to, and if you had to work under the handicaps they have had and have now, you might not do as well as they.
>
> • Don't be overcritical, especially in front of other members of an individual's own unit. It is easier to praise than it is to criticize, and it will pay bigger dividends.
>
> • Avoid at all costs "personality clashes." You must be the flexible individual. You are the guest, he is the host.
>
> • Remember, as an advisor you do not command anything in the host country's armed forces, not even the lowest private. Therefore, you cannot discipline, chastise or rebuke any member of the host country's armed forces. When this is done, many hard working hours by you and your fellow advisors are necessary to overcome the damage. If disciplining, chastising or rebuking is in order, inform the individual's superior and let him do it.
>
> You, the military advisor, are in the true sense of the word, the "soldier-diplomat." You must demonstrate tact and diplomacy; the old rough first sergeant must become the understanding counselor, the disciplinarian must be more flexible, the impatient, more patient. Yet, you must accomplish your mission. You cannot fail.

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Armor Center Commander's Update

MG William R. Desobry

The Armor Center Commander's Update is designed to give you a current report of activities taking place at the Armor Center. In this update, I will provide you with a special report on the Reorganization of the US Army in CONUS and its impact on Fort Knox.

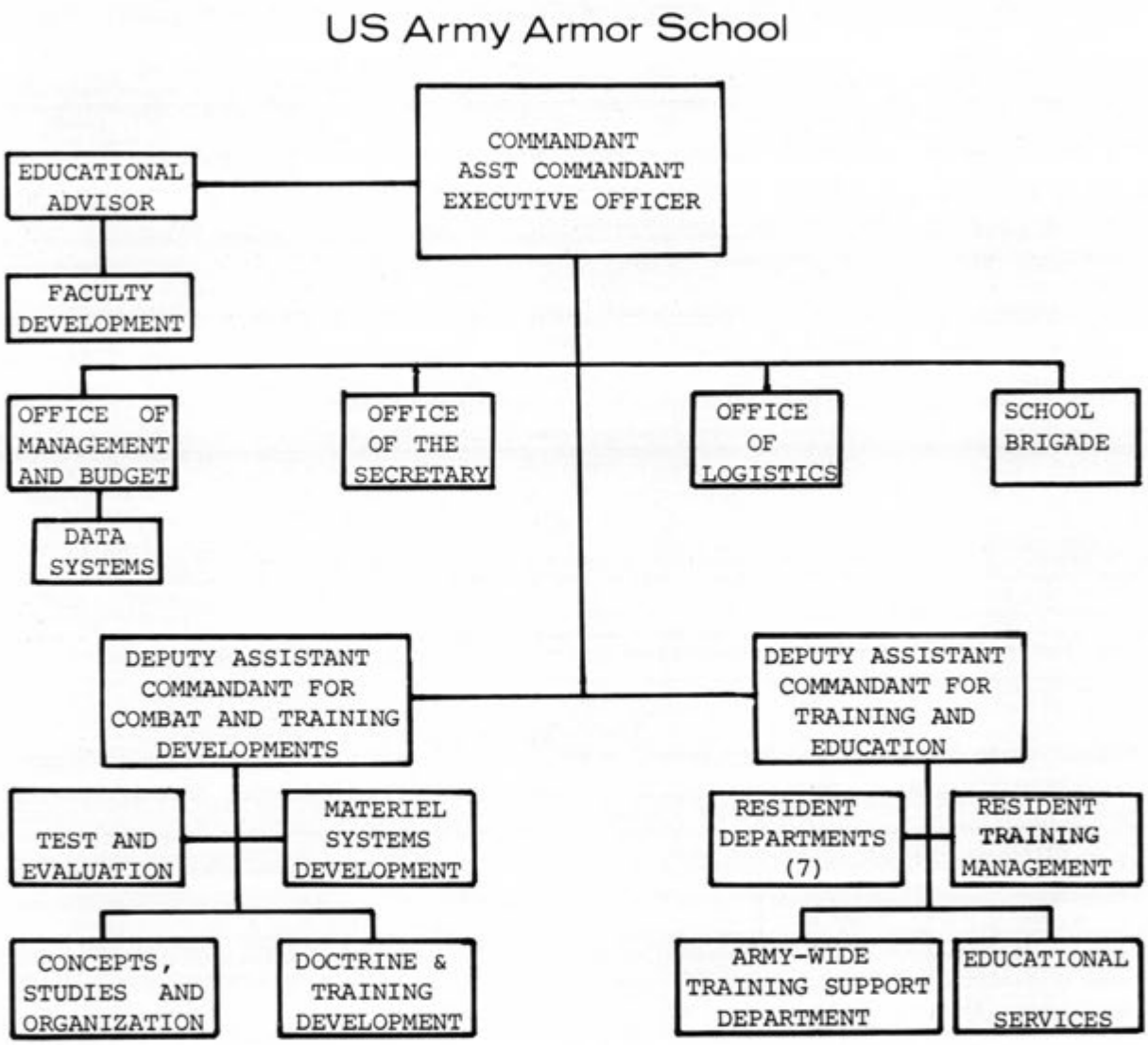
I am sure that by now you are aware that the Secretary of the Army and Chief of Staff of the Army announced a series of major actions designed to modernize, reorient and streamline the Army's organization in CONUS. In summary, the major parts of the reorganization that concern Fort Knox are: First, the elimination of the US Continental Army Command (CONARC), US Army Combat Developments Command (USACDC), and Third US Army. Second, the establishment of a Training and Doctrine Command (TRADOC) to replace CONARC at Fort Monroe, Virginia, with the mission to direct all Army individual training, education and the development of new doctrine, organizational and materiel requirements. Third, the establishment of a Forces Command (FORSCOM) at Fort McPherson, Georgia, with the mission to supervise unit training and combat readiness of Army units, including the National Guard and Army Reserves. Fourth, the establishment of the Army Health Services Command, designed to provide a single manager for Army medical health care activities in the US. It is estimated that the bulk of this plan will be implemented this calendar year.

This reorganization will impact Fort Knox in the following areas:

- With the removal of the CONUS Armies (First, Fifth and Sixth) from the installation chain-of-command, Fort Knox, being a training installation with a training center and a service school, will report directly to TRADOC. The only exception is that the reporting channel for actions concerning local STRAF units will be to FORSCOM.
- With the elimination of Third US Army and a realignment of all US Army areas, Fort Knox will become an installation in the Fifth US Army area. This will be a movement out of the First US Army area.
- With the reserve role shifting to CONUS Armies under FORSCOM, Fort Knox will become the location for one of nine Readiness Region Headquarters. It will serve as a coordination point for National Guard and Army Reserve readiness, training and support. This headquarters will be commanded by an Active Army major general.
- Within each Readiness Region, Readiness Groups (consisting of branch, maintenance and administrative teams and other specialists) will assist designated National Guard and Army Reserve units with their training problems. Fort Knox will also host a Readiness Group Headquarters, to be commanded by a colonel.
- With the transfer of ROTC responsibilities from the CONUS Armies to TRADOC, Fort Knox will become the location for one of four ROTC Region Headquarters designed to improve the overall management of the ROTC program. This Second ROTC Region Headquarters, to be commanded by a brigadier general, will be responsible for ROTC activities in Illinois, Indiana, Kentucky, Michigan, Ohio, Tennessee and Wisconsin.
- With the reorganization of AMC, the US Army Maintenance Board will move from Fort Knox to Lexington Bluegrass Army Depot, Kentucky. The Maintenance Board will consolidate with three other AMC activities to form the US Army Maintenance Agency. *PS* Magazine will also relocate with the Maintenance Board.
- With the creation of the US Army Health Services Command at Fort Sam Houston, Texas, the

Medical Department Activities (MEDDAC), which commands Ireland Army Hospital, will receive a greater degree of supervision from the new single manager for health care.

• By far the greatest impact of the reorganization here will be the elimination of USACDC and the resultant merger of the USACDC Armor Agency into the Armor School. With this merger, both combat developments and training will benefit from harnessing the wealth of experience found in the student body and faculty of the Armor School and the current Armor Agency organization which has been charged with developing new doctrine, organizational and materiel requirements. The new Armor School organization will be as shown here:



• We have established two Deputy Assistant Commandants, one to manage the resident instruction and the other to manage the combat developments process.

• The Deputy Assistant Commandant for Training and Education will continue the mission of the current Director of Instruction, that of resident instruction. The resident departments (Command and Staff, Communication-Electronics, Automotive, Weapons, Leadership and Educational Development, Allied Officer Training and Army Maintenance Management) remain essentially unchanged in their primary functions. However the instructors in these departments will play a greater role in being the subject matter expert in their particular areas of doctrine, organization and materiel. The Army-wide Training Support Department (previously the Nonresident Instruction Department) has assumed a new mission. In addition to their regular function of providing Army-wide instructional and reference support material, group study correspondence courses, and Armor Branch orientation and promotion material, they are now responsible for the development of the Training Extension Course

Program (TEC) in conjunction with the Combat Arms Training Board (CATB) at Fort Benning, Georgia. TEC will provide the soldier/unit commander in the field with a programed, audio-visual, individual or group learning package. The target? MOS and small-unit training in Armor and other subjects common to the combat arms enlisted man. Through diagnostic tests the user can also choose the lessons he needs. Distribution of audio-visual hardware, cassettes and lesson plans are slated for CY 73 to three Active Army Divisions and one Reserve Component division on a test basis.

• The Deputy Assistant Commandant for Combat and Training Development (resulting from the merger of the USACDC Armor Agency and the Office of Doctrine Development, Literature and Plans of the Armor School) will be responsible for all actions encompassed by the force development/combat development process for which the Armor School will assume responsibility as the proponent agency. This new organization will make the Armor School responsible as a "developer" as well as a "trainer-user." The Test and Evaluation Division will be responsible for combat developments experimentation and testing and outline test plans for the evaluation of materiel systems in comparison with the known trainer-user requirements. The Materiel Systems Division will be responsible for the development of Army materiel requirements and materiel documentation action for items on systems within the Armor School area of a proponent agency. The Concepts, Studies and Organization Division will be responsible for reviewing and developing new TOE and related documents, and for formulating operational and organizational concepts and doctrine pertinent to proponent organizations. All actions are targeted at brigade level and lower. The Doctrine and Training Development Division will be responsible for all Armor proponent training literature, job/mission analysis of all Armor MOS, and development of Armor proponent MOS test information and related documents.

In the final analysis, Fort Knox will gain approximately 200 military spaces. But the real impact is not in organizations or personnel lost or gained; it is here in the new dominant role that the Armor Center will play in the area of being a "developer" of new doctrine, organizational and materiel requirements. The Armor Center Team will also assume a greater role in the area of coordination (Update, July-August 1972). With the elimination of the CONUS Armies from chain-of-command for Fort Knox, we will have direct links to TRADOC, FORSCOM as well as to AMC.

This reorganization will assist in making Armor's combat development process more effective. In making the Armor Center a "developer," along with our current function of being the "trainer-user," we shall truly be the Home of Armor and Cavalry.

RAID

An Historical Example

Captain George T. Raach

On the morning of 17 April 1863, in the lazy crossroads town of LaGrange, Tennessee, 1,700 cavalrymen of the 2d Iowa and the 6th and 7th Illinois Volunteer Regiments stepped up into their saddles, formed into columns and rode south. Although these men had experienced only 18 months of active service, they were veterans of Shiloh and Corinth. The commander of this brigade was perhaps the most unlikely officer in the Union Army; certainly he was a most unlikely choice for the rank of Colonel of Cavalry. Benjamin H. Grierson was a former piano teacher who abhorred horses. Nevertheless, Major General U.S. Grant had personally chosen Grierson and his troopers for this expedition, and the brigade was riding that April morning because Grant was in trouble.

Grant's campaign to capture Vicksburg and divide the Confederacy east from west had been stalled since the previous December. Sherman's attack from the north at Chickasaw Bluff (11 miles above Vicksburg) had come to a halt amid the swamps and bywaters of the Mississippi River. Grant, who had overall re-

sponsibility for the Vicksburg offensive, had been unable to mount an attack during the winter months, and his political enemies in Washington were demanding his relief. Now, in mid-spring, Grant had conceived a bold plan to cross the Mississippi River and attack Vicksburg from the southeast. A high degree of risk was inherent in that decision because Grant's scheme of maneuver called for the placement of his forces against the river and then doing battle with the numerically superior Vicksburg garrison commanded by Major General John Pemberton. Grant, an audacious soldier, was inclined to accept this risk. He was not, however, disposed to accept the risk if Pemberton could call upon J. E. Johnson and the 16,000 men under his command to reinforce the garrison. It was to prevent this juncture and to gain freedom of movement that Grant called upon his cavalry.

Grierson was told to ride toward Mobile and to create as much havoc along the route as possible. He was to cut rail lines, burn bridges and destroy supply depots. When his brigade was south of a line from Vicksburg to Meridian, he was to turn west and rejoin Grant's Army at Grand Gulf.

Grierson was not a professional soldier, but the intent of Grant's order was clear. In 1863, the railroad was the primary method of transporting troops and materiel, while the primary method of communication was the telegraph. If the raid worked, reinforcement of Vicksburg would be impossible: the physical means would be in ruins; the available personnel resources scattered in pursuit of an elusive quarry. Finally, Grant would have the secrecy and the security necessary to implement his main attack against Vicksburg.

On 17 April the column moved nearly 30 miles without incident. The crucial element of surprise was on Grierson's side; he had crossed enemy lines undetected. The following morning the command was divided to give the appearance of a much larger force. Grierson sent Lieutenant Colonel Edward Hatch, commander of the 2d Iowa Cavalry, 12 miles to the east to follow a route parallel to his own. Soon after Hatch departed, the main column encountered its first resistance. The lead elements ran afoul of a small Confederate cavalry force which was quickly routed; however, the fact that a Union cavalry force was some 30 miles inside Mississippi was now known.

Grierson, aware that discovery equated to threat, wasted little time. He further pared his force by sending a battalion of the 7th Illinois at breakneck speed to secure the bridge over the Tallahatchie River

THE NATIONAL ARCHIVES

Colonel Benjamin H. Grierson

at New Albany. This was accomplished well before the main body arrived, and included the capture of four Confederate soldiers. Interrogation of these prisoners as well as reports from Hatch, who had blundered into another Confederate cavalry detachment, prompted the first of many tactical deceptions employed by Grierson. One of the prisoners revealed that a large detachment of the 18th Mississippi Cavalry and the entire Tennessee Cavalry were camped to the northwest. The latter was commanded by Lieutenant Colonel Clark R. Barteau and had engaged Grierson's brigade the previous spring at Corinth. Although Grierson had been the victor on that occasion, he had a healthy respect for Barteau's cavalry. Therefore, he turned east as though to join Hatch, forded the Tallahatchie River three miles above New Albany, and finally turned west where he spent the night five miles south of New Albany.

That evening Colonel Grierson must certainly have reflected upon the nature of his luck. While he had avoided a potential ambush during the day, misfortune came with the evening and the beginning of the spring rains. Now the roads along which he had hoped to make good speed would become quagmires. Deployment in the event of a surprise attack would be difficult, and there was a strong possibility that such an attack might come from the rear. Colonel Grierson had two choices: abandon his mission or sacrifice speed by resorting to deception in order to continue south. He chose the latter.

On 19 April, the third day, Colonel Grierson instructed Colonel Hatch to make a feint toward King's Bridge where the 18th Mississippi was training a new battalion of recruits. The main force would continue

General U.S. Grant

as unobtrusively as possible toward Pontotoc. Hatch's feint was designed ". . . to create the impression that the object of our advance was to break up newly formed cavalry regiments."

The gambit worked. The 18th Mississippi Cavalry fled King's Bridge while Grierson entered Pontotoc, where he destroyed a small store of ammunition and 500 pounds of salt, which was in short supply in the South. Camp was made that evening six miles south of Pontotoc—70 miles inside enemy territory—with all three regiments.

Grierson and his column penetrated 40 miles deeper into Mississippi on the fourth day. To add to the confusion created by two columns moving in opposite directions, he sent a third detachment on a limited expedition west to Oxford. That, in fact, he did create confusion among Confederate Army commanders in the area cannot be disputed. Reports reaching Pemberton at Vicksburg on 22 April numbered the raiders at 6,000—over three times the actual size. Lieutenant Colonel Clark Barteau had taken his 2d Tennessee Cavalry along the false trail to Oxford and spent the evening some 40 miles from Grierson.

A hard riding cavalry force could cover 40 miles in short order when it was on familiar ground as Barteau and his troopers were. Grierson knew that he was being pursued, and he was aware, also, that his mission could not be accomplished by fighting cavalry battles regardless of who won. Clark Barteau would not fall for the same ruse twice. Therefore, on 21 April, the former Illinois music teacher made another audacious decision.

Grierson summoned Colonel Hatch and instructed him to take the entire 2d Iowa Volunteer Cavalry back to LaGrange. Hatch was not to be inconspicuous in making this move. He was to engage any pursuing cavalry and to destroy as much of the Mobile and Ohio Railroad, together with adjacent telegraph wires, as he could. Insomuch as we are concerned with Grierson's raid and not with Hatch's, we will leave the 2d Iowa at this point. It is, however, interesting to note why Grierson chose the 2d Iowa to return: ". . . his horses on account of hard work . . . were not in my judgment as suitable . . . nor were his officers and men so well known to me as those of the 6th and 7th Illinois." Suffice it to say that Hatch diverted substantial forces from the pursuit of the main body, and eventually arrived at LaGrange.

Grierson also changed his formation from the column to a broad line. Once again he proved his willingness to take risks by dressing several of his troopers in Confederate uniforms. This group, known as the "Butternut Guerrillas," proved to be valuable in the days ahead. With these modifications, Grierson guided his force south to Starkville where he destroyed a large tannery and captured a number of mules.

On 22 April, the sixth day, the brigade swung five miles to the west as a diversion prior to moving south again. Shortly after resuming their original direction, the Butternut Guerrillas captured a courier who had both Pemberton's instructions for Barteau and the 2d Tennessee's payroll. The distance covered that day: 50 miles, cross-country.

Major General John Pemberton, headquartered in Vicksburg, was becoming increasingly anxious. Beset by reports of cavalry plundering through Mississippi and concerned for the security of vital military stores, he ordered a large number of replacements earmarked for Vicksburg as well as the entire Meridian garrison to take to the field. As yet, he was totally unaware of the nature or the location of the opposition. On 24 April he was to receive a report from Colonel J. R. Chalmers, who headed one of the pursuit forces, that the raiding party was composed of nine infantry regiments, three cavalry regiments and 18 pieces of artillery. Pemberton's best hope for halting Grierson, Lieutenant Colonel Clark Barteau, spent the 22d of April engaged in a date-of-rank dispute with Lieutenant Colonel James Cunningham, whose 2d Alabama Cavalry had been sent to Barteau. Barteau finally won the argument, but he must have been shaken by its ferocity. When he moved his command, he led it

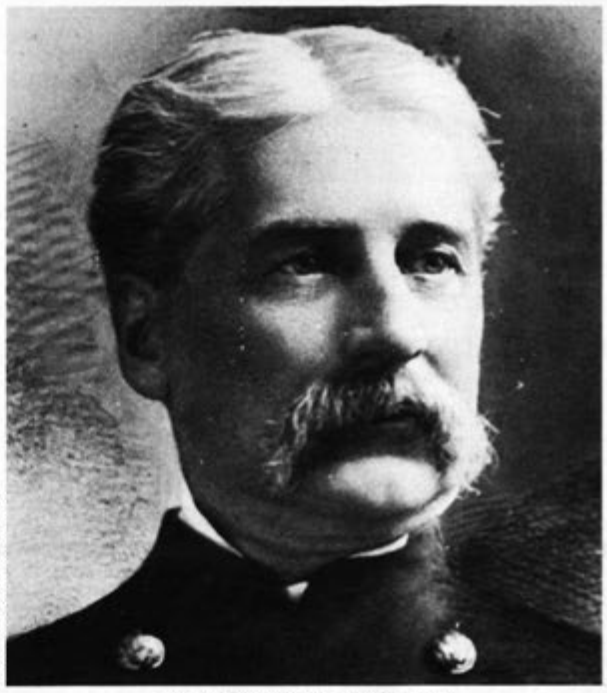
in the wrong direction and soon became hopelessly lost in the Sakatouche Swamp.

The seventh day of the raid, 23 April, passed uneventfully. As evening fell, however, the serenity of the day's march ended. Grierson paused south of Philadelphia long enough to brief his commanders and feed his horses, then ordered a night march. He had decided to strike.

Newton Station is a sleepy village which lies along the Vicksburg-Meridian railroad. In April of 1863, it was the site of a military hospital which was lightly garrisoned. It was an ideal place to destroy a railroad. Almost as though on cue from a Hollywood director, the 7th Illinois Cavalry charged into Newton Station just as the Vicksburg-bound 9:00 a.m. freight stopped for water. Within a few minutes of capturing this train, the Jackson-Meridian passenger train also fell into Union hands. By the time Grierson and the remainder of the brigade arrived, the 7th Illinois had netted a total of two steam engines and 35 carloads of ammunition, ". . . ordnance, commissary and quartermaster stores," exclusive of passenger cars. The two trains were quickly set afire while cavalry detachments were deployed in either direction along the railroad track to destroy the roadbed and cut telegraph wires. The remainder of Grierson's command ripped up the tracks running through town, captured and destroyed 500 small arms, paroled 75 hospitalized Confederate soldiers and burned the hospital.

At two in the afternoon, Grierson reformed his command and rode several miles south where the column halted for the night. The destruction which he caused was irreparable, for the South lacked both the raw resources and the industry to replace the destroyed materiel.

Pemberton was infuriated by the news of the raid on Newton Station. Union troops had been in his territory for eight days, successfully eluding all intercepting forces. Now they had destroyed a not too inconsiderable amount of supplies and rolling stock. Additionally, he was to learn on 25 April that the raiders had destroyed 11 bridges between Newton Station and Meridian. Pemberton's lines of communication to the east were a shambles. He was determined to punish the raiders. His only remaining supply line was the New Orleans and Jackson Railroad; he was convinced that the raiders' next objective would be the Jackson yards. He sent two full infantry regiments from Vicksburg to garrison Jackson. Then, despite the fact that he knew that Grant was maneuvering on the west bank of the Mississippi,



THE NATIONAL ARCHIVES

Lieutenant Colonel Edward Hatch

he did a most unusual thing. "All the available cavalry was at once placed at the disposal of Generals Ruggles and Chalmers" to chase the raiders. The total force in pursuit of Grierson's forces numbered 3,300. The bulk of this cavalry was located at Grand Gulf, Grant's point of debarkation on the Mississippi side of the river.

Grierson had no intention of attacking Jackson. On the 25th of April he rested his horses and men, and sent small parties along the railroad toward Jackson "to create an impression that he intended to strike the railroad again," but his real intention was to ride west toward Grand Gulf, cutting the New Orleans and Jackson Railroad when he crossed it in the vicinity of Hazlehurst.

On 26 April, the tenth day, he began this move. The command crossed the Leaf River before 0600 hours and burned the bridge behind them. The column marched throughout the tenth day and into the eleventh. By midmorning of 27 April, the 6th Illinois Cavalry again practiced its trade in Hazlehurst. Several sections of the New Orleans and Jackson Railroad were destroyed together with 500 artillery bombs, some small arms ammunition and a large quantity of food. Grierson now decided to employ another feint, this time toward Natchez.

Shortly after taking the Natchez road from Hazlehurst, his lead elements captured a Confederate wagon train bound for Vicksburg. The booty from this haul included a huge 64 pound Parrot rifle (rifled cannon) and 1,400 pounds of musket powder (repre-

senting 179,200 charges or the equivalent of the basic load for seven infantry regiments).

The next day, Grierson continued toward Natchez. Elements were sent east to again cut the New Orleans and Jackson Railroad at the town of Byhala. Grierson had expected resistance since leaving Newton Station, and was surprised at the lack of rebel forces in the area. At Union Church his surprise vanished.

Advance elements of his column encountered the pickets of the Confederate cavalry force operating from Grand Gulf. A sharp, but indecisive skirmish resulted. The Confederate troopers appeared to withdraw, but maintained contact. Grierson began to suspect a trap, and that evening his suspicions were confirmed. Prisoners brought in by the Butternut

Guerrillas included an artillery battery commander who freely admitted that the force was being led into an ambush.

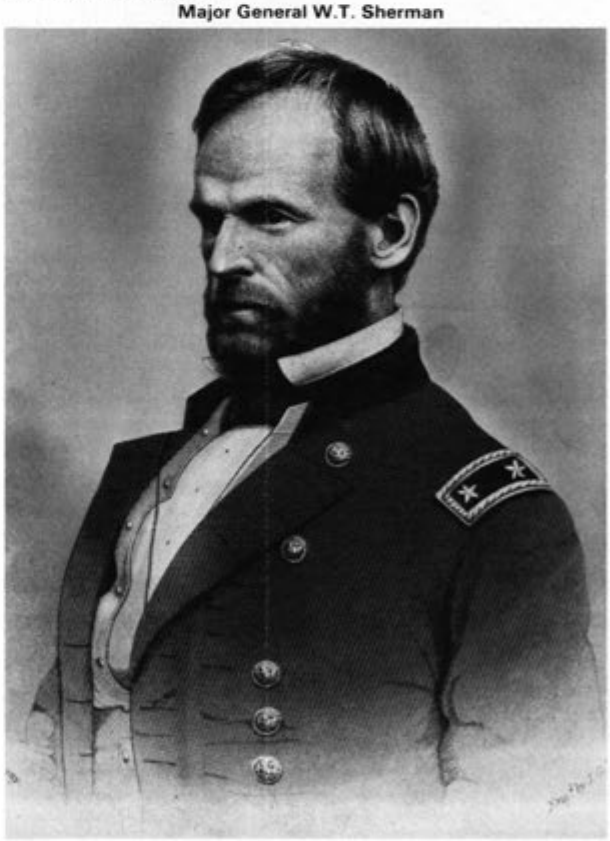
Grierson's position had appreciably worsened. His forays into Hazlehurst and Byhala had again pinpointed his location. Forces dispatched against him from Jackson could reach Hazlehurst by rail within three hours. Forces from Newton Station, while slowed by burned bridges and ferries, might arrive momentarily. A cavalry regiment blocked his route to a linkup with Grant at Grand Gulf. The only open road led south to the Union forces which occupied Baton Rouge.

Grierson went south. As soon as the Byhala party returned, the column backtracked to Brookhaven. Soon after sunrise on 29 April the brigade charged the town, catching the garrison completely off guard. Grierson's official report indicated that ". . . prisoners . . . several hundred tents, and a large quantity of quartermaster's and commissary stores, arms, ammunition and c (sic) were captured." The prisoners were paroled, the materiel destroyed, together with one-half mile of railroad track and a like section of telegraph wire.

On the 13th day of the raid, while Grierson devastated Brookhaven, General Franklin Gardner, Confederate States of America, commander of Port Hudson, Louisiana, sealed the southern escape routes to Baton Rouge. Alerted by dispatch riders from Vicksburg, he ordered roadblocks set up at Clinton and Woodville, Mississippi. Despite the Brookhaven excursion, however, General Pemberton's forces still expected Grierson west of Union Church. It was not until the 30th of April that these would-be pursuers learned that Grierson was not coming, but by then it was too late, the trail was cold.

Grierson struck twice more at the New Orleans and Jackson Railroad on 30 April. These final raids netted two trains, totaling 40 freight cars, plus locomotives, more sections of track, a 300-foot trestle and telegraph wire. Grierson then issued the order of the day: "A straight line for Baton Rouge and let speed be our safety."

Major General W.T. Sherman



The force suffered its first casualties as it complied with that order. There was but one bridge across the Tickfaw River, and the Louisiana Partisan Rangers held it. A sharp fight ended in the Rangers' retreat, and two days later, on 2 May, the 16th day of the raid, Grierson led his force into Baton Rouge. That same day, General John Pemberton realized that Grant, not Grierson, was his main adversary. This revelation came too late. The days spent in pursuit had tired his forces and scattered them throughout Mississippi. He fought Grant at Champion's Hill on 16 May 1863, and he lost. Pemberton surrendered Vicksburg on 4 July 1863, after a siege which, thanks to Grierson, could not be broken.

"Grierson has knocked the heart out of the state," Grant reported to Halleck on 6 May 1863. He was right; Grierson had caused in excess of six million dollars in damage. Grierson's own report itemizes the account: "During the expedition we killed and wounded about one hundred of the enemy, captured and paroled over 500 prisoners, many of them officers, destroyed between fifty and sixty miles of railroad and telegraph, captured and destroyed over 3,000 stand of arms and other army stores . . . to an immense amount; we also captured 1,000 horses and mules."

Writing in his memoirs, U.S. Grant stated, "The raid was of great importance for Grierson had attracted the attention of the enemy from the main movement against Vicksburg." William T. Sherman, certainly no novice where raiding was concerned, thought so much of Grierson's accomplishments that he requested Grierson's services three times.

That Grierson accomplished his mission cannot be denied. Reviewing assorted cavalry raids in 1891, the *Journal of the United States Cavalry Association* summarized this achievement: "Grierson . . . deprived Pemberton of the power of concentrating . . ." This same publication was to announce a year later that "Grierson's raid . . . marks the beginning of cavalry independence." The study of this raid has lapsed, however. Cavalry leaders such as J.E.B. Stuart have attracted much more attention owing, at least in part, to their flamboyant nature. While Grierson never wore a plumed hat, his raid far exceeded the accomplishments of any other cavalry commander during the war, for, in the final analysis, anyone can ride around an army if he is willing to ride far enough. Riding through an army is a much more difficult journey.

CAPTAIN GEORGE T. RAACH, commissioned from the University of Iowa, has served with the 2d ACR in Germany and the 11th ACR in Vietnam. He is currently on the faculty of the Command and Staff Department, USAARMS.

Simfire

HIT/KILL INDICATOR

by Captain Matt D. McKnight

The tank commander had his *M60A1* in good hull defilade position overlooking a road and treeline 1,800 meters to his front, and was scanning the area with his binoculars. The gunner's eyes were fixed to the periscope as he traversed back and forth—there was nothing to be seen. Suddenly, another tank appeared on the road, a perfect flank shot. Dropping down to his rangefinder, the commander began his fire command: "Gunner, SABOT, moving tank!"

The gunner turned the main gun switch on and quickly indexed APDS into the ballistic computer. Now the gunner could clearly see the aggressor tank moving along the road and announced "Identified!" The loader selected an armor piercing round, opened the safety to the fire position and said, "Up!"

Now the tank commander was ranging to the aggressor tank. Through his rangefinder he could see the double image quickly merging to a single image. "Fire!" he commanded.

When the gunner announced, "On the way!" and pulled the trigger, he had a good lead on the moving tank. There was a loud blast and the gunner's vision was obscured for a moment by the smoke and flame. Then he realized the round had passed behind the moving tank. The aggressor tank stopped, traversed right and returned fire. The attacker was now under attack.

Quickly, the loader reloaded another SABOT round. The gunner laid his sights on the center of mass of the aggressor tank. "On the way!" the gunner shouted. Again, the blast, the flame and the smoke. Through their sights the gunner and tank commander could see the second round hit the target. The tank commander announced, "Target, cease fire!" Clearly visible, the aggressor tank was dead in the road with a large cloud of smoke rising externally from the turret.

The engagement described above took place at Fort Knox in October of last year. The tanks involved were equipped with a new training aid called *SIMFIRE* Hit-Kill Indicator which has been in existence since 1967. The device is currently in the testing phase for the Army, although no procurement decision has been made. Originally developed by the Solartron Group of Schlumberger, Ltd. for the *Chieftain* tank, development and production of *SIMFIRE* in the US is managed by Schlumberger's EMR Division in Sarasota, Florida. The device has had extensive testing by the British Army and has been accepted for service on their main battle tanks. *SIMFIRE* is also currently in use by many other nations in Europe and the Middle East.

For years, tank crew training has suffered from a lack of realism. Tactical field training is geared towards training the tank commander while the driver and gunner usually go along for the ride. In simulated battles, victory went to the crew who blinked their headlights first, or fired the first blank round. No means existed to measure crew proficiency without firing a service round of ammunition. A primary goal of training should be the training of the crew to fire on the aggressor tank and kill it. Until now, no method of gauging a crew's gunnery skills in ATTs or field tactical training has existed. The dependence

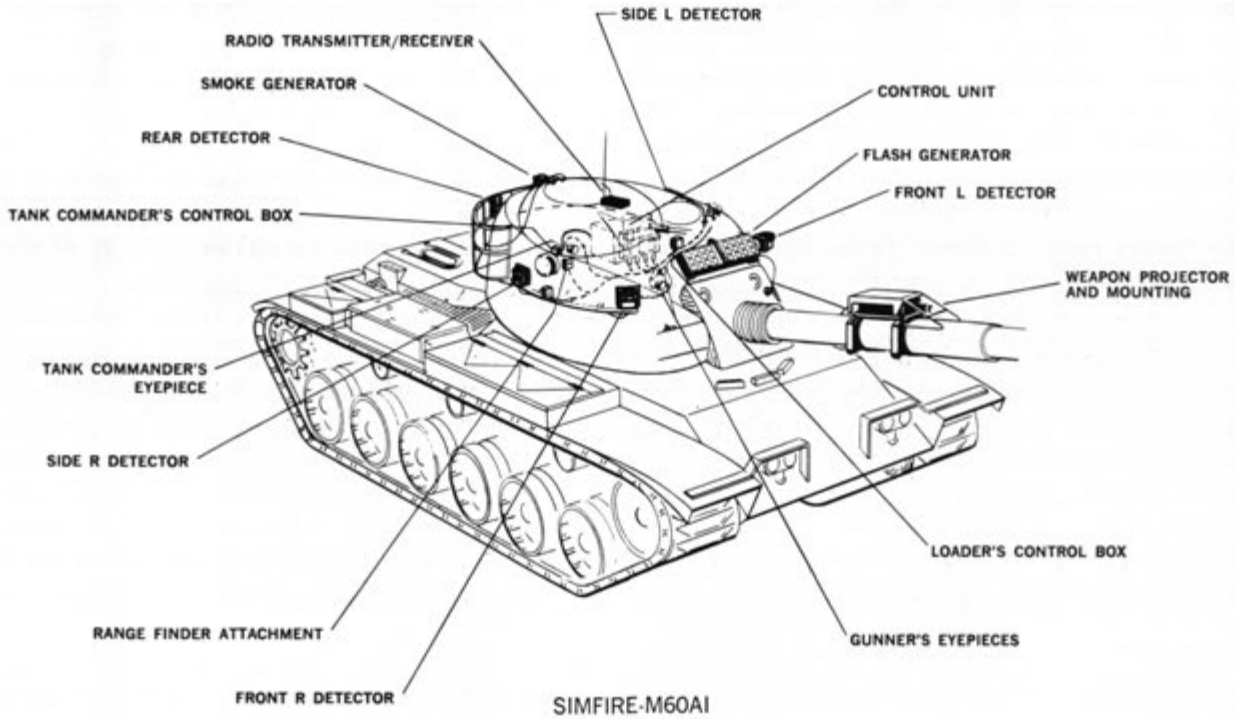
on an umpire's decision has robbed training of its value and may even contribute to a false sense of security. *SIMFIRE* forces the crews of both tanks to use all available cover and concealment and all proper methods of gunnery. When a gunner misses his target, the crewmen of the target tank know they have been fired on, and have the ability to return the fire. The umpire's decision on who killed whom is eliminated. No doubt remains as to which crew achieved the kill.

An armored unit is forced to boresight all fire control systems to include the Xenon searchlight every time the unit conducts tactical training. The overall proficiency of the tank crew is assessed every time the unit conducts tactical exercises. This assists the commander both in measuring the level of proficiency of his tank crews as well as accurately determining additional training requirements.

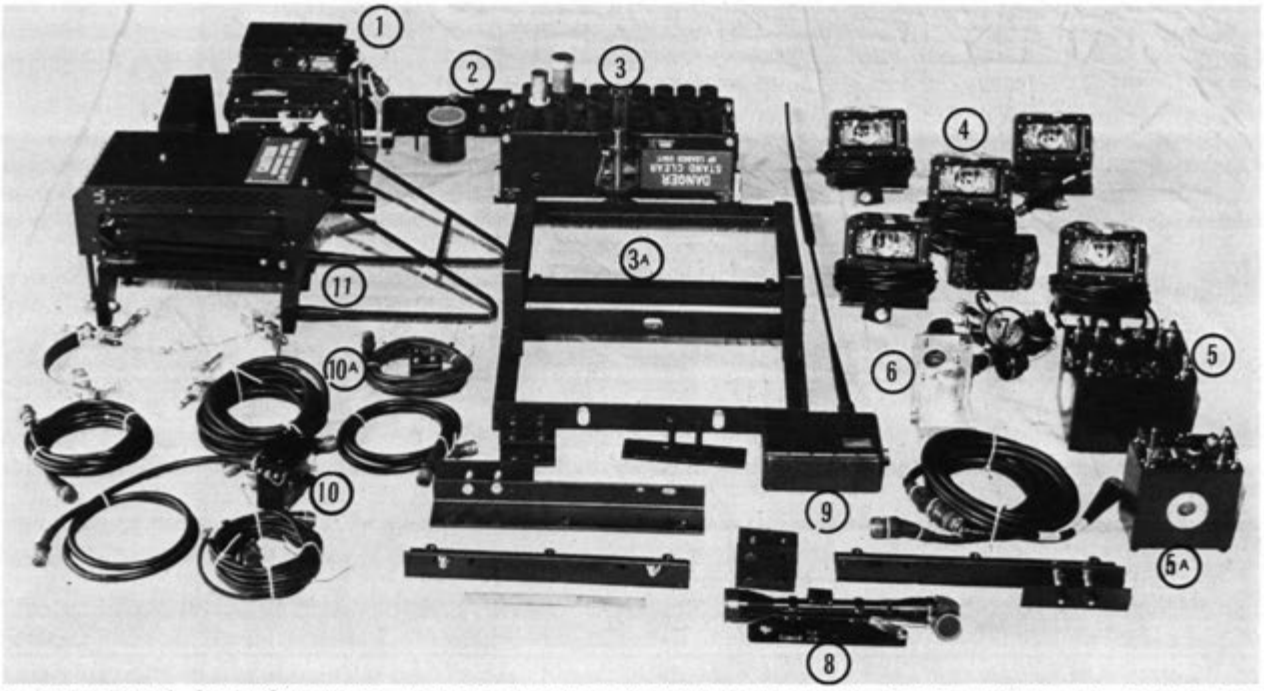
SIMFIRE has unlimited potential as a training aid for teaching tank gunnery. It can be adapted for use by Regular Army, National Guard and Reserve units to conduct gunnery training and live fire; however, a new laser tank gunnery training device (*XM55*) has recently been accepted to facilitate tank gunnery training and may be used for Tables I, II and III in FM 17-12. *SIMFIRE* has the capability to be mounted on a moving or stationary target with more than one tank firing at the same time. This would afford students who find gunnery difficult the opportunity to fire as many *SIMFIRE* rounds as necessary to correct their problems.

National Guard and Army Reserve units find it difficult to conduct realistic tank crew gunnery training with their home station equipment due to ammunition, range, and time limitations, and training area availability. *SIMFIRE*, mounted on home station equipment, would allow them to conduct practice firing tables on police ranges or any open area near their Armory on short notice.

The *SIMFIRE* system can be installed by a crew with minor assistance from the unit's turret mechanic. The system has seven main components. The first is the laser projector. This unit is mounted on the main gun of either the *M60* or *M48* series tank. The projector fires a low pulse, eye-safe gallium arsenide laser which is in the infrared portion of the spectrum. The projector has a series of rotating lenses which allow the beam to correct for superelevation or lead angle. The projector can fire a lead angle of 6 mils for a fast moving target, or 3 mils for a slower target. The beam will scan the target in a



SIMFIRE-M60AI



1. Control Unit; 2. Smoke Generator; 3. Flash-Bang Generator; 3a. Mounting Brackets; 4. Test Box Detector; 5a. Test Box Laser Projector; 6. Rangefinder Attachment; 7. Three Eyepiece Adapters; 8. Alignment Aid; 9. Radio Transmitter/Receiver; 10. Tank Commander's Remote Box; 10a. Loader's Remote Box; 11. Laser Projector with tree guard.

360-degree motion. The overlap in the center of the scanning area provides a kill zone equivalent to the dimensions of the standard NATO kill zone. This gives the system a constant kill zone out to the maximum range of the system.

Mounted above the Xenon searchlight is the flash-bang generator holding 24 rounds of pyrotechnic simulators. Each time the gunner or tank commander fires the main gun, the flash-bang will discharge one round. This device is optional for tactical training only, and can be disconnected for range use.

Five detectors are mounted around the turret. These provide 360-degree coverage around the turret and ± 15 degrees in elevation. When the laser beam activates a detector, the device activates the radio receiver transmitter unit (R/T). The R/T transmits a message to the attacker to provide fall of shot sensing. The detector also activates the under-attack light and horn within the turret of the tank.

Mounted on the bustle of the tank is the smoke generator. A single smoke cartridge mounts in the generator, which is activated when the kill circuit has been activated. This device will emit smoke for approximately 30 seconds. As with the flash-bang generator, it may be disconnected for range use.

The heart of the system, the control unit, is mounted in the turret of the tank. Above this unit is the under-attack horn, light and the arm switch for the flash-bang generator and smoke generator. Behind a lockable transparent plate is the On-Off switch and the umpire's reset switch, which brings the system back to life if it has been killed. Also located behind the plate are the ammunition counters. Any number of rounds up to 99 HEAT and 99 APDS rounds may be indexed to simulate a basic load of ammunition. The lockable plate means that only the umpire can bring the system back to life or increase the basic load of ammunition.

Located in the cupola is the tank commander's remote box. It works in conjunction with the rangefinder attachment fitted behind the ranging knob. As the TC ranges to the target, the rangefinder attachment converts the range into an electrical impulse. When the TC finishes ranging, he must press the interrange button on the remote box. The range is

A SIMFIRE Hit

British Umpire's Gun

fed into the control box where the superelevation for the type of round loaded is applied to the projector. If HEAT is loaded, and APDS is indexed into the ballistic computer, the projector will fire the laser beam as if it were a HEAT round, causing the gunner to miss the target.

Eyecups fit over the lens of the gunner's periscope and telescope. These provide the tank commander and gunner with sensings by the illumination of four small red lights at the twelve, three, six and nine o'clock positions; short is a red light at only the six o'clock position. A kill would be shown as red lights at the six and twelve o'clock positions.

On the loader's side of the turret is the loader's remote box. This box has two buttons, one red and one green, marked HEAT and APDS. The loader is required to push either button depending on the tank commander's fire command.

The system is connected to the tank's firing system at the main gun safety. The cable which is attached to the firing mechanism on the main gun is detached from the safety switch and the *SIMFIRE* cable is

Main Gun Configuration

connected in its place. When the main gun switch is on, any of the main gun triggers will fire the *SIMFIRE* system.

The only extra steps *SIMFIRE* requires other than normal gunnery procedures are that the tank commander press a button to enter range and that the loader press a button to simulate loading a round.

With *SIMFIRE*, we in Armor could provide more realistic training for our entire crew during tactical training. Our crews in the field would be forced to use all gunnery procedures and take advantage of all cover and concealment or be put out of action. At last we would have a realistic means to evaluate the combat effectiveness of our tank crews. An Armor unit can maneuver freely, but all the maneuver is meaningless if the individual crews are not capable of hitting and destroying their target. *SIMFIRE* provides a means of adding a new dimension, and a new degree of realism never before achieved in tank crew training.

CAPTAIN MATT D. MCKNIGHT III was commissioned in 1965 from the Tennessee Military Academy and has served two tours in Vietnam with the 11th ACR. He is currently assigned as Service Test Project Officer with Armor Test Branch, Fort Knox.

by Kenneth S. Brower

THE ISRAELI ARMORED CORPS

The Armored Corps of the Israeli Defense Force (IDF) has become one of the largest and most advanced in the world. Unlike the well-publicized Air Force, this has been accomplished without general notice by foreign observers.

Formed in 1948, the Corps was first equipped with pre-World War II French *Hotchkiss* light tanks smuggled into Israel. These supplemented three requisitioned *Cromwell* and *Sherman* British tanks acquired earlier. These vehicles were manned by foreign volunteers who spoke no common language. Each had his own concepts regarding doctrine, technique and maintenance. While they were far from a major success in combat, lighter units, equipped with half-tracks, armored cars and armed jeeps, were decisive in the fighting in the Fall and Winter of 1948-49.

As a result of combat experience, the importance of a mobile armored force was recognized by the IDF. However, there were few Israeli citizens with armor experience, no technical vocabulary existed in Hebrew, and no accepted doctrine had been developed. Worse still, elite elements of the army were veterans of the infantry-oriented Palmach. They were, because of their Socialist nature, against discipline, conformity and technology—all necessary elements of mechanized warfare.

Nevertheless, the formation of true armored units was begun; but, limited funds and access to equipment made it difficult for the Corps to grow. The only alternative was to purchase surplus World War II *Shermans* and rebuild them in Israel. These first vehicles were rearmed with a collection of weapons of dubious quality, the best being a few 3-inch rifles taken off 1943 US *M10* tank destroyers.

By 1952-53, one full armored brigade had been organized. It included a full battalion of tanks, one battalion of mechanized infantry mounted on half-tracks, and two battalions of motorized infantry. By 1955, about 200 mixed *Shermans* were in service. These were soon reinforced by *AMX13* tank destroyers received from France. These 13-ton vehicles, with 75mm, 62 caliber, 3,200 feet per second guns, were a significant addition to the undersized and technologically obsolete force.

By the 1956 Sinai Campaign, the Armored Corps included three armored brigades and two battalion-sized armored combat teams. They were equipped with new *AMXs* and two new models of the *Sherman*. The latter, designated *MK50*, consisted of either 100 standard French *M4A3s* with vertical volute suspensions, 16-inch treads, *T23* turrets and US 76mm guns, or Israeli-rebuilt *M4s*, identified as the *MK51*. Mounting the *AMX* 75mm high velocity gun, the *MK51* had a rebuilt *M4* turret, extended to accept the breech and recoil of the rifle, and counter-weighted to balance its long barrel. In all, about 230 tanks were committed to the drive on Sinai. In addition, the first of several newly formed batteries of self-propelled 105mm howitzers, French *MK50s* on the *AMX13* chassis, were attached to one of the engaged armored brigades.

The Corps was assigned a secondary role in the Campaign by the infantry-dominated general staff. However, the three brigades largely decided the outcome. The 7th Brigade, under Colonel Ben Ari, struck through central Sinai, while the newer 27th, under Haim Bar Lev, broke through at Rafa. While the 37th Brigade was less successful, it did achieve some degree

of success under the leadership of Colonel David Elazar.

After Sinai, the Armored Corps was placed, with the Air Force, at the top of the priority list. Senior personnel were transfered into the Corps to learn the art of armored warfare. Among these were top infantrymen such as Colonels Bar Lev, Tal and Elazar, and many captains and majors from the elite paratroopers. The tactical and technological lessons of the Campaign were studied and restudied.

The result was rapid growth, combined with a total reorientation of the entire army so that it would be able to support the Armored Corps. Additional *Shermans* and half-tracks were purchased and the Ordnance Corps was kept busy rebuilding the vehicles.

In 1959, the Armored Corps acquired their first heavy tanks—50-ton *Centurions* armed with high velocity 20pdr guns. In 1964-65, 110 *M48A2Cs* were acquired from West Germany and rebuilt in Italy.

During the same time period, the third model of the *Sherman* had been designed to counter the growing number of *T54/55s* in Arab service. This vehicle, the *MK51HV*, mounted a stabilized 51 caliber, 105mm gun in a *T23 M4* turret. The old chassis was fitted with a 23-inch tread and the horizontal volute suspension of the *M4A3E8*. Also, it was retrofitted with a "power-packed" 460-horsepower Cummings diesel engine. The *L51* rifle mounted was originally designed by the French to fire roll-stabilized 24-pound HEAT shells at 3,000 feet per second. This round could penetrate any know MBT, independent of range (360mm at 0 degrees incidence, fuse function up to 75 degrees graze angle). The net result was a 37-ton tank, armed with a 105mm gun, capable of 27 miles per hour with a 150-mile range.

As these new tanks were being introduced, a new family of self-propelled artillery entered the Armored Corps inventory. This included *M50* French and US *M7* 105mm, self-propelled howitzers, plus 155mm *M50* French gun howitzers with a 17.6-kilometer range, mounted on radically-modified *M4* chasis. The APC half-track chassis was also used as a motor carriage for 120 and 81mm mortars, *SS11* antitank guided missiles and smooth bore 90mm antitank guns firing fin-stabilized HEAT rounds.

In 1962-63, the Corps acquired its first British *L7* (*M68*) 105mm guns. These were retrofitted on the Centurions purchased earlier. Plans were also made to acquire *M48A1s* from the US, which were to be brought up to *M48A3* standards, complete with *M68* 105mm guns. Before the Six Day War, the *AML90*—a 4x4 armored car mounting a 90mm gun—was added to the arsenal.

Parallel to the large scale acquisition of combat ma-

Brigadier General Tal

teriel, a major change in doctrine and technological proficiency took place. Initially, the Corps had been comprised of undertrained amateurs; but continuous emphasis on field training during the 1965-67 period inevitably raised the individual level of personnel competence. This was compounded by a rigid application of discipline and doctrine on the theoretically lackadaisical IDF, which molded individuals into the technicians needed.

Doctrine was originally oriented toward maneuver, as the size of the Sinai precluded the relatively small Egyptian Army from defending all its avenues of approach. Thus, breakthroughs without assault were possible, or at worst, night infantry attacks against the small existing forts would suffice.

However, by 1965 Egypt could seal all Sinai passes due to the massive growth of its military power. Furthermore, they had accepted Soviet defensive tactics against infantry and armored assault. The Corps had to reorient itself so that it would be able to accomplish daylight assault action of brigade and divisional size against massive defensive areas.

The Corps was able to check proficiency and doctrine, especially in gunnery, during a series of small clashes along the Syrian border in the early Sixties. These actions provided senior officers with much-needed combat experience. Not surprisingly, capacity rose from engagement to engagement.

During the Six Day War, the Armored Corps apparently included the equivalent of about nine armored and three to five mechanized brigades. Many additional companies of tanks supported deployed infantry units. In all, the Corps fielded about 1,000 tanks during the campaign: 110 *M48A2Cs;* 150 *AMX13s* 250 *Centurions;* and 450 *Shermans,* including *MKs 50, 51* and *51HV.*

Seven armored brigades or their equivalent, were committed to the south. Division TAL, facing Rafa, had two armored brigades with battalions of *M48A2Cs,* 105mm *Centurions, AMX13s* and *MK51s.* One additional armored brigade was split; a mechanized infantry and *AMX13* battalion committed to

GAZA, while one battalion of *M48A2Cs* reinforced the mechanized paratroop brigade in TAL Division. Division SHARON, attacking Abu Aghellia, had an organic armored brigade with battalions of 105mm *Centurions* and *MK51HVs* plus a few *AMX13s* for reconnaissance. Division YOFFE, in the center, had two reserve armored brigades with *Centurions*. Another armored brigade was deployed farther south to defend Eulat.

The Jerusalem Area Command was backed up by Harel mechanized brigade, including about 50 *MK51s*, a battalion of 20pdr armed *Centurions* and *AML90* armored cars. In the north, two armored and one mechanized brigade faced Samaria and the Golan Heights. These units were mainly equipped with *MK50* and *51s;* although there were a few companies of *Centurions, MK51HVs* and *AMX13s*.

M48A1s have been delivered and rebuilt. Additional *Centurions* have also been procured. Starting in 1970, new American armored vehicles, including the *M60A1, M113A1, M109* and *M107*, have been purchased in large numbers.

By October of 1969, the Armored Corps had doubled in size and each year since then has seen the formation of additional brigades.

It is now probable that Israel can deploy at least 20 armored and 10 mechanized brigades; these units being equipped with over 2,000 MBTs, full-tracked self-propelled guns and over 3,000 APCs.

An armored brigade comprises two battalions of tanks and one of APC-mounted infantry, backed up by an armored reconnaissance company with tanks and APCs, and a self-propelled artillery battalion. The mechanized brigade has two battalions of APC-

The Corps led the way on all fronts, and although overshadowed by the more visable Air Force, was largely responsible for the magnitude of the victory. Led by then Colonel Schmeulik Gonen-Gorodish, the 7th Brigade swept 40 miles in the first eight hours of the conflict and, although meeting heavy resistance, destroyed three to four enemy brigades. In individual tank-to-tank battles, superior Israeli guns, ammunition, crews and doctrine resulted in excellent kill ratios.

The Corps emerged from those six days in relatively good shape and had become more important in the eyes of the general staff. Only about 50 Israeli tanks were destroyed beyond salvage, while about 1,100 tanks and 1,500 APCs were captured from the Arabs. A good number of these captured vehicles were salvaged and soon became part of the Corps inventory.

Since the conflict, a large number of American

mounted infantry and one battalion of tanks backed up by a lighter reconnaissance company and a battalion of self-propelled mortars. All tank battalions appear to have four armor companies, aside from a headquarters unit. Nine to eleven tanks comprise a company. Infantry battalions include three infantry companies and a headquarters/support company with APC-mounted heavy weapons. The Corps is task-oriented and unit TOE will vary accordingly; thus, the figures given are problematical baselines.

Technologically, the Armored Corps is extremely advanced, even if a percentage of its vehicles' chassis are obsolescent. Seventy-eight per cent of the tanks are considered superior to the standard *T55s* on a vehicle to vehicle basis. The remaining regunned *Shermans* are at least equal. It uses all basic types of NATO armor piercing ammunition—HEAT, HEP and APDS—and is equipped with laser rangefinders

and sophisticated night-firing optics.

In the past, Israel did not manufacture complete armored vehicles. However, by 1975 both an MBT and APC may be in production. In the early 1960s, West Germany developed a steel, low profile, non-amphibious APC for Israel, using *M113* suspension and propulsion components. These vehicles, pre-production models of which were delivered in 1964-65, may have been in production in Israel since 1969. The MBT has been under design for several years and will be a compilation of the best features found on American, British and Russian vehicles. It will have a low profile cast turret and will be propelled by US diesels and transmission systems. Undoubtedly, it will include an integrated stabilized fire control system built around a laser rangefinder and computer. It will probably mount the 120mm 55 caliber *L11* gun, although there is a chance that it may carry a gun-missile of the 142mm *ARCA* type.

Approximately 30 per cent, or about 450 million dollars, of the total defense budget is committed to the Armored Corps. Of this, at least two-thirds is for procurement, maintenance, research and development.

Almost all officers and senior professional noncommissioned officers have combat experience, as do the vast majority of tank crews. The so-called War of Attrition allowed the Corps to accrue invaluable combat experience with virtually negligible casualties. Major armored actions during the 1,100-day campaign included brigade-sized actions across the Jordan River at Karameh, battalion-sized sweeps in the Golan Heights, and a cruise along the Red Sea coast of Egypt, aside from innumerable small actions along the various lines. Doctrine and tactics have been tested during these actions, and Corps level maneuvers have enabled commanders to maintain the feel of large scale combat.

Further growth can be expected over the next few years, until the Corps reaches a point where the number of reservists lost each year equals the number of draftees. Somewhere between 1975-80, the *Sherman*, half-track and captured Russian equipment will be discarded, and the Corps will be standardizing on American and new Israeli equipment. At present, the power of the Armored Corps is probably more of a deterrent to Russian/Arab action than the highly-publicized Air Force.

Purely pragmatic analysis of the Corps suggests that it will probably not be put to the test in the near future. Only a massive misjudgment, such as that which occurred in May of 1967, could cause ZAHAL to once again unleash its mighty armored sword.

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ANTI TANK WEAPONS

A Reappraisal

by Richard M. Ogorkiewicz

Much has been said lately about the shortcomings of battle tanks and in particular about their vulnerability to various new antitank weapons. As a result their future effectiveness has been seriously questioned.

The concern about the future of battle tanks is in part justified, particularly where their development has failed to make the best use of technological opportunities. However some of the attention devoted to the failings of battle tanks might have been employed more profitably in examining the effectiveness of antitank weapons which in many ways is more questionable than that of tanks. What is more, the existing antitank weapons are becoming something of an anachronism.

SHAPED CHARGES AND STEEL ARMOR

At first sight the effectiveness of the latest antitank weapons might seem beyond all doubt. In particular, their precision-made shaped charges can penetrate steel armor to a depth equal to as much as 5 1/2 times their diameter. This means that the most powerful of the current antitank guided missiles, which have 6-inch diameter warheads, can penetrate solid steel to a depth of 33 inches. This is more than enough to perforate the thickest tank armor. In fact, the most heavily armored of today's battle tanks have armor whose maximum thickness is of the order of 10 to 12 inches. Thus, even the thickest tank armor is only one third of

that required, in theory, to provide protection against large antitank guided missiles.

In practice the situation is mitigated somewhat by the fact that missile warheads seldom go off under the conditions which produce maximum penetrations. Moreover, the perforation of armor by shaped charges is not necessarily lethal.

On the other hand there is no prospect of improving the protection of tanks by increasing still further the thickness of their armor, because this would result in an unacceptable increase in their weight. For instance, an increase in steel armor equivalent to raising the horizontal thickness of their frontal plates from a maximum of 10 to about 30 inches would bring the weight of the conventional type of battle tank to somewhere in the region of 70 to 90 long tons.

Such heavy weight would obviously make the strategic transportability of tanks very difficult. Any increase in weight would also increase the ground pressure of tanks, because the track-to-ground contact area can not be increased in proportion to vehicle weight. Thus, tanks weighing between 70 and 90 long tons would have nominal ground pressures of at least 14 and 16 psi, respectively. This is considerably more than the ground pressure of contemporary battle and would adversely affect tactical mobility.

In consequence, because there is little scope for increasing the thickness of steel armor, battle tanks appear very vulnerable to all guided missiles and even to some of the smaller antitank weapons.

MORE EFFECTIVE ARMOR

Steel armor is not, however, the only form of protection available to tanks. In fact, although it has been used almost exclusively in the past because of its effectiveness against high-velocity armor piercing projectiles, solid steel armor is the least efficient form of protection against shaped charge warheads.

More effective forms of protection against shaped charges include materials with lower densities than steel. In general their thickness has to be greater than that of steel but not to the extent that their density is lower. In consequence they can provide protection against shaped charges which weighs considerably less than solid steel armor. For instance, a low density plastic material such as polypropylene could provide protection whose weight, in theory, would be only one third of that of the equivalent steel armor.

Plastics can not be used by themselves, of course, as tank armor. Nevertheless, the theoretical performance of polypropylene against shaped charges is indicative of what might be achieved by advancing from solid steel armor to more sophisticated forms of protection incorporating nonmetallic materials as well as steel or other metals. A price would certainly have to be paid for the more advanced types of composite armor, particularly in terms of their increased bulk. However, this should be more than compensated for by the increased protection which they would offer in relation to their weight.

What might follow is illustrated by assuming that when the low density composite armor comes into use its performance is the same as the theoretical performance of polypropylene. This would result in tanks having frontal protection against shaped charges equivalent to approximately 30 inches of steel without being any heavier than they are. In consequence, even current weight battle tanks would be immune over the frontal arc to antitank guided missiles with warheads of up to 6 inches in diameter.

If or when this happens the existing antitank weapons will lose much of their effectiveness. In fact, even the latest antitank guided missiles such as the *Dragon*, the *TOW* and even the *Shillelagh* would become largely obsolete.

It is, of course, possible to produce missiles with larger diameter warheads than the current ones and if they are large enough they will perforate any type of armor. But if the missiles are large they are certainly not going to be portable. Thus, the development of more effective types of armor is going to rule out the

possibility of individual soldiers having personal antitank weapons with which they can "wipe tanks off the battlefield," as some people would have us believe.

Portable antitank weapons will no doubt continue to be developed but mainly for short-range self-defense of small units separated from their main antitank weapons, or for use against light armored vehicles. Their role might be comparable to that of Molotov cocktails, which have been used in the past to knock out tanks under favorable circumstances but which have never been considered as a major antitank weapon.

Otherwise, to retain their position as a major antitank weapon in face of advances in armor protection, guided missiles will clearly need to have relatively large warheads. This, in turn, will make it necessary to mount them in vehicles, which will need to have some degree of armor protection as well as cross-country mobility. In consequence, antitank weapon systems will tend to resemble tanks and this will even out the odds between them.

VULNERABILITY OF ANTITANK WEAPONS

The need for relatively large warheads is not, however, the only reason why antitank guided missile systems will have to be mounted in armored vehicles. Another reason is that in their present form they are very vulnerable to enemy fire.

The fact that missile launchers and their crews are highly vulnerable is obvious when the missiles are fired in the open or from the tops of armored carriers. However, it is widely assumed that the crews of antitank guided missiles will be able to engage tanks by surprise, from prepared or at least favorable firing positions, in what amounts to a series of ambushes and that they will not be exposed to enemy shell fire or other disturbances. This will undoubtedly occur on some occasions but to assess the effectiveness of antitank weapons on the basis of such favorable circumstances is unrealistic, to say the least.

Similar comments apply to some of the trials with missile-carrying helicopters in which very high tank-to-helicopter kill ratios were achieved but which, in effect, amounted to series of ambushes against advancing tanks. Had tanks been used in similar circumstances they too could have scored large numbers of hostile tank kills.

Under less favorable circumstances antitank guided missiles are likely to be exposed to intense shell or rocket fire and may have to be launched from unprepared positions. Their performance is then going to be seriously degraded unless they are properly mounted in armored vehicles that can offer them a degree of protection. Moreover, unless they are mounted in armored vehicles they will have great difficulty in moving under fire from one position to another which will reduce their overall effectiveness, particularly when

battle conditions are fluid and static antitank weapons can be outmaneuvered.

To some extent all these facts have been recognized already. This is shown by the number of antitank guided missile systems already installed in armored vehicles to make them more effective. However, while some of them are undoubtedly much more effective than portable or truck-mounted missile systems, further development of armored vehicles armed with guided missiles may not result in the most effective antitank weapon of all.

ALTERNATIVE WEAPONS

The most serious competitor to the missile-armed antitank vehicle is an armored vehicle armed with a gun firing very high velocity, fin-stabilized *arrow* projectiles, or APFSDS (Armor-Piercing, Fin-Stabilized, Discarding Sabot) shot. Because of their large length-to-diameter ratio, *arrow* projectiles concentrate their kinetic energy over an even smaller area of the target than the current spin-stabilized APDS shot and can, therefore, perforate even thicker armor. In fact, potentially they represent as much of an advance on the APDS ammunition as the latter did on the original, full-caliber AP shot.

Moreover, there is no reason to suppose that the alternatives to steel armor which might be so much more effective against shaped charges will be significantly better than steel against *arrow* projectiles. Because of this and the superior armor-piercing performance of *arrow* projectiles it might be possible to reduce the caliber of high velocity guns and certainly to make it considerably smaller than that required by shaped charge projectiles or missiles.

The smaller size of *arrow* projectile rounds would make it possible to carry more of them in a vehicle than guided missiles. Like other gun projectiles, they could also be fired at a higher rate than guided missiles and they would also be very considerably cheaper.

The choice between the two types of weapons depends ultimately on the range at which one becomes superior to the other at killing tanks and what this range is in relation to the most frequent ranges of engagements. At very long ranges guided missiles are undoubtedly superior to guns. Thus, were all engagements to take place at such long ranges there would be almost no point in considering guns. But at short ranges guns are superior and on average something like three out of four engagements are likely to occur within the range in which guns with advanced fire control systems are superior to missiles. Guns are, therefore, superior overall as the basic antitank weapon because they are likely to produce more successes during the course of a complete operation.

ANTITANK VEHICLES

The acceptance of armored vehicles armed with guns firing very high velocity *arrow* projectiles as the basic antitank weapons would not, necessarily, eliminate the need for antitank guided missiles. Guided missiles could, in fact, remain an important complementary weapon for use on the less frequent occasions when enemy tanks can be engaged at long range.

The ideal solution would be to mount the guided missiles, in pods or otherwise, on a number of the basic gun vehicles. These would then act in support of the other gun vehicles but retain their shorter range gun capabilities. A less desirable but possibly technologically unavoidable alternative would be to develop special vehicles armed only with missiles.

A more attractive type of complementary, long-range antitank weapon might be an armored vehicle with a gun of larger caliber but lower muzzle velocity than the guns of the basic antitank vehicles. Such a gun could fire effective shaped charge projectiles with semi-active or passive terminal homing which would be competitive with corresponding guided missiles at long ranges but cost less. When not engaging enemy tanks this type of large-gun complementary antitank weapon could also perform some of the roles of self-propelled howitzers, with obvious gains in the cost-effectiveness of units equipped with it. Conversely, self-propelled howitzers might be developed in the future to the point where they could take on the task of engaging enemy tanks at long range with terminally guided shells in addition to their existing roles.

The precise form of the gun or missile armed anti-

tank armored vehicles is open to discussion as there are several possibilities. One possible configuration of the basic gun-armed vehicle could weigh only 25 long tons but have armor protection against kinetic energy projectiles comparable to the best of today's tanks and three times as good as theirs against shaped charge missiles, if a two-man crew were accepted.

Whatever its precise form, the antitank vehicle is

TOW mounted on a Mechanical Mule

not going to be basically very different from a tank. This is hardly surprising since any attempt to optimize the performance of antitank weapons must lead to them acquiring the mobility and other characteristics of tanks, while tanks are already effective antitank weapons.

AN ANACHRONISM

Ultimately the two categories of weapons are bound to merge into a single tank/antitank vehicle and their separate existence would only be a wasteful duplication of effort. What is more, the existence of a separate category of antitank weapons is an anachronism.

A separate category of antitank weapons is an anachronism because it implies that there is something special about combating enemy tanks. This may have been true in the past when tanks were few in number and the combat elements of armies consisted very largely of foot-slogging infantry. In those days tanks were encountered relatively infrequently and weapons against them were not needed at all times. They were, therefore, logically assigned to special antitank units which were added to support the basic infantry organization as required.

The position has radically changed in recent years. In several critical areas the threat facing the United States and allied armies comes primarily from mechanized forces fully equipped with tanks and other armored vehicles. Therefore, tanks are no longer likely to be met on infrequent occasions but continuously and in large numbers. In fact, they and other armored vehicles have replaced the infantry soldier as the primary target on major battlefields.

As a result, it is no longer sufficient to think in terms of adding a few portable antitank guided missiles to infantry battalions which are still organized primarily to fight other infantry, or even to create special antitank units at brigade or division level. What needs to be done, instead, is to reequip and reorganize all maneuver battalions in such a way that they can effectively fight enemy armored units.

In the light of all that has been said already about antitank weapons, all maneuver battalions should be provided with the best possible tank/antitank vehicles. Whether this will be achieved by reequipping tank battalions with such vehicles and assigning companies of them to mechanized infantry battalions or by creating mixed tank-infantry battalions need not be decided at this stage. Arguments will no doubt be found for and against each alternative and there are successful examples of mixed battalion-size units as there are of homogeneous battalions.

What is more important at present is to recognize that in areas where mechanized forces form the hostile threat all maneuver battalions must be capable of effectively fighting enemy armored units. In consequence they should all be provided with the best possible tank/antitank vehicles which would eventually replace the present mixture of battle tanks and antitank weapons organized in separate units.

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Beware The Expert

by Brigadier General Thomas W. Bowen

New ideas set their originator apart from the common run of man—for an original thought is a rare and delicate treasure, something to be nurtured and protected at all costs. To the military man, original ideas represent more than mere money and manpower spaces—for soldiers' lives may ride in the balance. If progressive ideas are not forthcoming and inculcated in our military doctrine, our strategies will degenerate into futile spasmodic responses to the alarms of the moment.

But when we free ourselves for a moment from preoccupation with immediate problems and begin to delve for original and progressive thoughts, we encounter a specter which haunts the military man—a generation of critics who dismantle ideas. These critics, for the most part modern intellectuals, are highly educated and thus acutely conscious of the sweep of history. Molded by education and profession, their very nature is chronically apprehensive.

In a cloud of intellectual verbalization, the product of their own endeavor, they detach themselves from the working level under the guise of seeking broader objective perspective. They assume the status of scholars, traditionally respected by society, voguishly sophisticated and skeptical. This status is developed from an education based on near-sacred respect for history.

History records all things which man has ever done or thought. It does not encompass new ideas, for by definition only the past can be history. Normally there is no shortage of new ideas; the problem has always been to obtain a hearing for such thoughts. This requires a breaking through of the crusty rigidity and stubborn complacency of the expert. Too often the expert is endowed with the responsibility to expertize solely by virtue of his status as an intellectual scholar and not by merit as an actual practitioner. As a scholar, generally prone to smartly sophisticated skepticism, his evaluation will follow a protected approach.

His simplest analysis consists of a memory search through history. Obviously, if it is a truly new idea, no record of its merit exists in the annals of history. Therefore, without a documented verification of the idea's past success and prone to avoid any castigation upon his personal status, the intellectual expert will assume his role as a skeptic. As time passes our intellectual, sophisticated, skeptical expert becomes more cautious, less eager, and accumulates deeply rooted habits and fixed ideas. Tradition bends his thoughts and acts. Maturation develops settled policies and habitual modes of solving problems. This develops, in turn, greater efficiency but decreases flexibility. Routines become increasingly fixed and practices are congealed in elaborate written rules. This stage of procrastination is surpassed by the inevitable growth of a choking underbrush of customs and precedents. An accepted way to do everything comes into being. New ideas, eccentric experimentation and radical departure from past practices are ruled out. Conventionality becomes pervasive.

With the development of customs and precedents, intellectual evaluations tend to place greater emphasis on *how* things are done and *less* on whether they are done. Acclaim is awarded, not to accomplishment, but to the ingrained knowledge of the rules and accepted practices. Here, the intellectual, sophisticated, skeptical and conventionality-minded expert adds "reputable" standards to the obstacles to new ideas and thoughts.

When we face the problem with all its facets and intricacies of ideas, we can rationalize a need for experts to help us. For they can expertize by study; they can verbalize obstacles and problems; segment, define and re-define; summarize, outline, and after complete dismantilization, form a committee for further study. Unfortunately this action forms the expert's completed cycle, a small circle, like the initial ripple on a quiet pond. The committee will form the second ripple, which in its ultimate manifestation will become a bigger ripple, paralleling the smaller ripple but appallingly concentric and circular in nature. This same effect is generated by a drop falling into a bucket of water. The full impact of the entire expert process is a lethal prophylactic toward solutions and much needed new ideas. So beware of the expert for he is a wily devourer of originality in all forms.

BRIGADIER GENERAL THOMAS W. BOWEN, a graduate of the US Military Academy in 1948, holds a master's degree in Psychology from Vanderbilt University. From March 1968 to July 1969 he served as the Senior Advisor of Thua Thien Province. From April 1971 to June 1972 he was assigned as CG, US Army Advisory Group, I Corps, and Deputy Senior Advisor, Military Region 1. General Bowen is currently the Director of Intelligence Support in the Office of the Assistant Chief of Staff for Intelligence.

YOU TOO, HHC

by Captain Larry R. Jordan

Armor's mission of *move, shoot and communicate* includes the ability to move out at a moment's notice in any direction and engage the enemy. Tank companies and cavalry troops are expected to be proficient at rapid, orderly movement. We sometimes overlook the fact that this applies to headquarters company as well. Under the Armor concept of highly mobile warfare, headquarters, field and combat trains, and command posts must be equally adept at making swift and frequent moves.

Why then do administrative moves and road-marches conducted by a headquarters company sometimes drag to completion only after endless radio transmissions, elements missing the SP, and wrong march orders? The headquarters is the brain which directs and controls a battalion's armored "fists." If that brain is slow and unresponsive, the battalion's offensive capabilities are correspondingly diminished.

Every unit, regardless of size or composition must have an established order of march and SOP for use in either routine or emergency moves. Subordinate leaders should, as a matter of course, coordinate among themselves such things as routes out of platoon and section positions, sector boundaries, and vehicle order of march. Within platoons and sections, each crew member must know where his element falls in the march order, and the position of his vehicle within the platoon. This is of even greater importance in a headquarters company due to the density of vehicles, personnel and equipment.

The problem is further compounded by the fact that the command posts and trains, although headquarters company assets, are rarely colocated. Often a headquarters commandant is faced with having his assets scattered over a battalion assembly area without the opportunity to form his march unit in a central location.

All units should be able to move out of an assembly area with a minimum of radio transmissions. In combat, such traffic would either alert the enemy or be made impossible by jamming. The well-trained company should be able to move out, day or night, without

a single radio transmission, on the basis of a march order issued by the commander. Likewise, the unit must be highly proficient in the use of hand-and-arm signals and other visual means of communications. This allows the commander to direct or maneuver his company in any manner necessary without relying upon vulnerable radio communications.

Alert subordinates must prevent or eliminate problems concerning the move by checking their areas for lost equipment or stray personnel, having all vehicles in combat ready status, and moving their units into the proper position within the formation. The fact that much responsibility is placed on the subordinate leaders supports the theory that only well-grounded and capable junior leaders should be assigned to a headquarters company. In some instances, headquarters company has become the exile for those junior leaders having difficulties in tank or cavalry platoons. Unfortunately, some commanders have discovered the folly of this practice during a battalion ATT or ORTT. Capable leaders make well-trained units.

It is relatively simple to determine whether or not a headquarters company or troop is a well-trained, efficient organization; but little, if any, information is available on the subject of training specifically aimed at achieving proficiency. Day-to-day housekeeping operations preclude mission-oriented training on the company level as found in line companies. However with a little imagination and effort, mess, transportation or medical sections can benefit from useful, realistic training while continuing to support the battalion's garrison requirements.

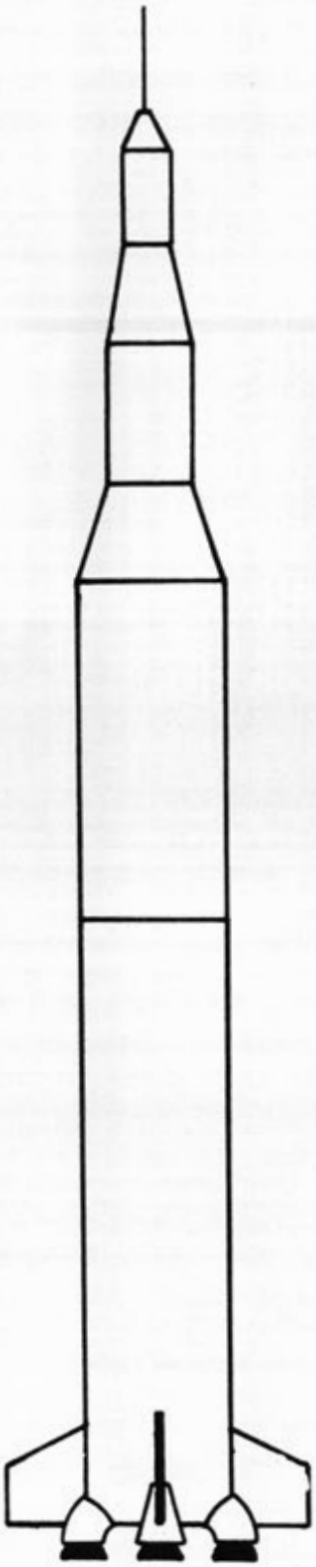
A field mess can be set up to provide training for the mess personnel, and the food transported back to the garrison area in insulated food containers by the transportation section. Additionally, all other truck requirements could be supported from a field location with refueling and maintenance facilities located at the tactical truck park. The same type training is feasible for the medical platoon, battalion staff, or any other section in headquarters.

These areas, plus the ability to move quickly and efficiently, are only one part of the training problem facing a headquarters company or troop. Each must be addressed in detail if battalions and squadrons are to reach their full potential in combat effectiveness.

CAPTAIN LARRY R. JORDAN was commissioned in 1968 from the US Military Academy. He has served with Armor, Cavalry and Infantry units and is presently assigned as a Project Officer with the Combat Arms Training Board.

APOLLO ARMOR

by Sp4 Michael E. Dunbar



As *Apollo 17* thundered from its pad to begin a 238,900-mile journey to the Moon last December 7th, three silver-coated *M113* armored personnel carriers stood waiting, with engines running, 1,800 feet from the *Saturn V* launch vehicle. Had it become necessary to abort the mission and evacuate the Apollo crew prior to ignition, Astronauts Gene Cernan, Ronald Evans and Harrison Schmitt would have become the responsibility of the 14 men in the nearby APCs.

Armor's role in manned space exploration had its beginnings early in the planning stages of the Mercury Program. NASA's first concern has always been safety for its astronauts; and before man ever set foot in a spacecraft, a detailed, practiced and re-practiced method of getting him out of the spacecraft in the event of danger had been developed. When Alan Shepard opened space travel to man in May of 1961, an APC was in position close to *Freedom 7*.

The *M113s* used by the astronaut rescue team have been modified to withstand 2,000 degrees of heat for durations of four to five minutes, and provide enough insulation so that interior temperatures will not exceed 150 degrees. During the Mercury, Gemini and early Apollo flights, this was accomplished by coating the entire vehicle with layers of dyatherm—an asbestos-like material. However, tests conducted late in the Apollo Program indicated that adequate heat protection could be achieved by the use of reflective aluminum paint. Last summer, the APCs were sent to Anniston Army Depot, Alabama, and coated with the protective paint. Also, they were up-engined and modification kits were added to update them. These procedures reduced vehicle weight and provided greater speed and mobility—essential elements in a situation where seconds become the critical factor between tragedy and survival.

During the six manned Mercury flights, the APCs used as rescue vehicles were fitted with a special hydraulic lift unit attached to the front of the vehicle. If conditions were such that the rocket was in immediate danger of blowing on the pad and all normal routes of exit were closed to the astronaut, the entire Mercury capsule could be fired clear of the launch vehicle. Once on the ground, it would be retrieved by the APC and carried to a safe location. A similar hydraulic unit was also attached to the APCs for the ten Gemini missions. However, due to the increased weight and size of the Apollo Command Module, this hydraulic lift unit

The slide-wire and cab used to bring the astronauts to the waiting APCs

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from the base

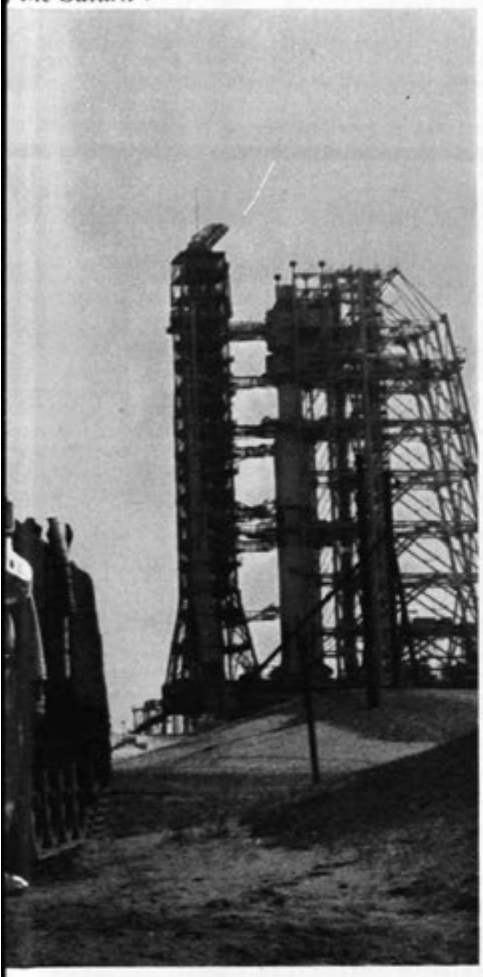
During Mercury and Gemini the spacecraft could be carried to safety by APCs.

On the move towards one of the three helicopter pads ready for evacuation

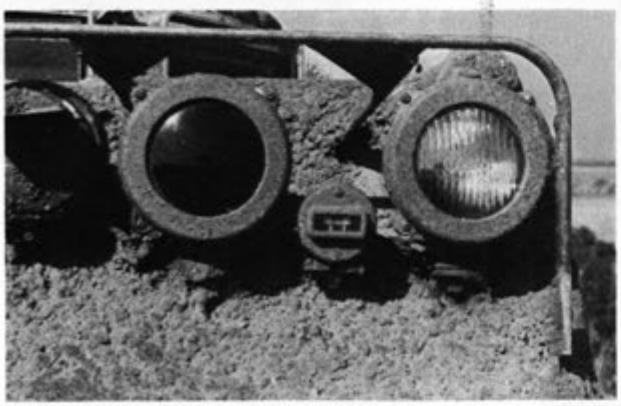
PHOTOS BY NAS

During a simulated emergency a rescue team member rushes to aid the flight crew

ber
ue team
, 1,800 feet
f the Saturn V



The APCs show their new heat protective paint in training prior to the launch of Apollo 17



A close-up view of the asbestos coating which protected the crew

AND JAMES DEAN

no longer proved feasible and was removed from the rescue vehicle.

The astronauts who crewed the 11 manned Apollo missions had three alternative escape, or egress, modes available to them prior to the arming of the emergency escape system—a device activated just prior to ignition that would blow the command module free from the *Saturn V* and down range to safety. The selection of the particular egress mode would be determined by the gravity of the situation, the number of people involved, and the immediacy of fire with the resulting explosions. However, all modes depend upon the skill of the rescue team and the speed and mobility of their APCs.

The first egress mode employs a simple slide-wire system. A nine-man cab would take the astronauts, plus any of the team used to seal the astronauts in the spacecraft, from the 320-foot level to the APCs waiting 1,800 feet from the base of the rocket. From this position, the APCs would transport them to one of three helicopter pads where all personnel would be airlifted from the launch complex.

Both the second and third egress modes assume that the command module has been sealed and that the astronauts have been incapacitated to such a degree that they require assistance in returning to ground level. These two modes require the APCs to move to the base of the *Saturn V*.

In the second egress mode, six members of the rescue team, called the Prime Six, would assist the astronauts from the spacecraft to ground level. Once this was accomplished, the astronauts would be placed in the APCs and driven to one of the helicopter pads for evacuation.

The third egress mode takes two additional complications into account: the *Saturn V* is in immediate danger of blowing on the pad; and, there is not enough time to reach one of the helicopter pads. After the Prime Six have assisted the three Apollo astronauts to "A-Level"—the first level above the launch pad—all personnel enter a teflon-coated tunnel leading down to the "hard room."

Located beneath the steel and concrete launch pad, the "hard room" would protect the astronauts and rescue crew from the intense fire and explosions ripping apart the *Saturn V*. The room, which is mounted on steel springs to absorb the shock of explosions, is equipped with first aid equipment, oxygen, food and water. It can support life for the 72 hours that would be required to clear the rubble and dig the men out.

The rescue crew arrives at Cape Kennedy about 20 days prior to any manned launch. During this time, they practice and re-practice the egress methods, and are present for any of the pre-flight testings which place astronauts in the command module.

At T minus 5 hours on launch day, the rescue crew arrives at their site 1,800 feet from the rocket. At approximately T minus 2 hours the spacecraft is sealed, and the rescue team assumes the sole responsibility for the safety of the astronauts. By T minus 1 hour, the rescue team is buttoned-up in their APCs. At T minus 30 minutes, they don oxygen masks—as the countdown ticks away to ignition and lift-off. As the *Saturn V* begins to develop the 8-million pounds of thrust that will lift the 346-foot structure from the pad, the rescue team can begin to relax—their part of the Moon mission successful and finished.

When *Apollo 17* splashed down on 19 December off the *USS Ticonderoga*, the Apollo Program drew to a close. But manned space exploration, and Armor's role in it, will continue.

Now scheduled for mid-May 1973, a *Saturn V* will fire a two-story, unmanned space station called *Skylab* into a 233.5-nautical-mile earth orbit. Twenty-four hours later, a modified Apollo Command and Service Module containing three astronaut-scientists will be placed in parking orbit by a *Saturn IB*. After docking with *Skylab*, the astronauts will begin a 28-day mission. This initial mission will be followed by two of 56 days each. During the 140 days of space-living, over 60 detailed scientific experiments will be conducted.

As with the Mercury, Gemini and Apollo flights, APCs will again be standing close to the future manned launch vehicles—fulfilling their vital role in the US Space Program.

SPECIALIST FOUR MICHAEL E. DUNBAR holds a master's degree in Theology and has done graduate work in journalism at Kent State University. He is currently the assistant editor of *ARMOR* Magazine.

by Colonel John R. Byers

During the height of the American presence in Vietnam, units in Europe found themselves quite some distance down the priority list for personnel, equipment and spare parts. The general upshot of this was a slow but steady deterioration of maintenance. Standards remained high and there was no slack in the demanding requirements of the command maintenance management inspection. Nor was there any reduction in training requirements. At this same time, however, units experienced considerable difficulty in gaining trained, qualified maintenance personnel as well as crews. As a result, units continued to run their vehicles through field exercises while maintenance was performed by depleted crews of inadequately trained men with incomplete tool sets and insufficient spare parts. For the most part, these men tried hard and the fact that their units continued to roll is to their credit. But their maintenance condition was well below what most commanders would prefer.

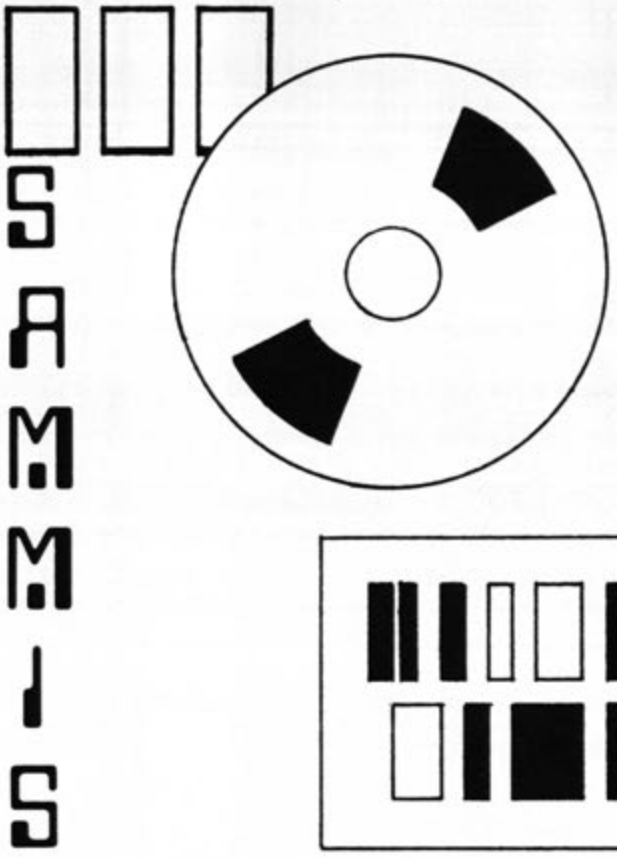
In the 4th Armored Division (which would convert to the 1st Armored in May 1971) as in most other mechanized units in Germany, the maintenance problem became acute. A number of programs were established to focus on this problem, some of which were very successful and some less. One of the most successful was the Semi-Automated Materiel Management Information System (SAMMIS), which is still in effect today.

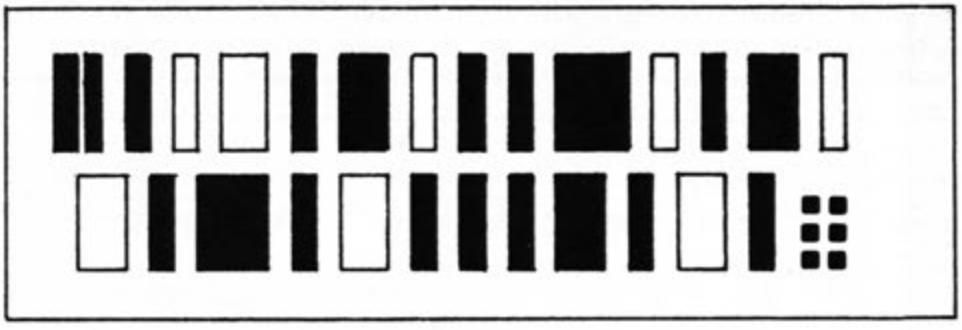
SAMMIS was first developed by Colonel C. R. McFadden, then commanding officer of the 4th Armored Division Support Command. The system was refined into more usable form by his successor, Colonel Kurtz Miller and Brigadier General George S. Patton, the assistant division commander for support, and implemented by Major General William W. Cobb. It has been continued in essentially the same format by the subsequent commanders, Major General James V. Galloway and Major General Adrian St. John.

The system is a materiel readiness management tool which provides brigade, battalion and separate company commanders an automatic data processing (ADP) printout of all not operationally ready (NOR) major items assigned to that command. Copies are also provided each divisional maintenance unit so that they will know the status of each unit they are supporting. Thus, SAMMIS provides a common basis for command, staff and support unit action and coordination on materiel readiness problems.

SAMMIS is made up of two parts: a reportable items list which identifies the equipment to be reported; and the reportable items list operational status (RILOS) which reflects those reportable items that are NOR.

The reportable item list initially consisted of one list of the authorized equipment shown in Appendix III, TM 38-750, which is reported in accordance with AR 270-1. The Division Commander found, however, that this list was inadequate to depict accurately the Division's real status, and a second list was developed which contained additional items essential to operational readiness. This list includes such items as air compressors, intercommunications sets and helicopter avionics.





1ST ARMORED DIVISION

NOR TIME STATUS

AS OF 2271

FOR UNIT IDENTIFICATION CODE

AFX

ARM

NOUN	MODEL	USA OR SER	1-30	31-60	61-90	91-120	121-180	OVER 180	WHERE NOR
TANK	M60	9B7644		1					S
TANK	M60A1	9B6887	1						U
VTR	M88	9B4662		1					U
TRUCK	M151A1	02CK4869		1					S
TRUCK	M561	03B74971		1					U
TRUCK	M54A2	5D6216	1						U

1ST ARMORED DIVISION

REPORTABLE ITEMS LIST A AS OF 05 FEB 72

ECC	NOMENCLATURE	5B 700-20 LINE NO	SA 700-20 SUB LINE NO	RICC-I	SIL	QTY REQ BY TO&E	QTY AUTH BY TO&E	QTY OH	UIC TOT
GB	CARRIER 107MM MORTOR SP	D10740		X	X	53	53	53	
GR	CARRIER CARGO TRACKED AT	D11048		X		75	75	75	
GP	CARRIER CMD RECON FTA	D11401		X		188	180	188	
GQ	CARRIER COMMAND POST LT	D11538		X		140	140	140	
GG	COMBAT ENGINEER VEHICLE	E56577		X	X	8	8	4	
GB	GEN SET DSL 30KW 60CY	J36109		X	X	1	1	2	
GB	GEN SET DSL 100KW 60CY	J38712		X		2	2	2	
QB	GEN SET GED 5KW 60CY	J47068		X		32	32	39	
QB	GEN SET GED 5KW 60CY	J47068	J47891	X				5	
QB	GEN SET GED 5KW 400CY	J48713		X		2	2	2	

1ST ARMORED DIVISION

REPORTABLE ITEMS LIST OPERATIONAL STATUS (RILOS) REPORT

EQUIPMENT LIST

AS OF 2271

FOR UNIT IDENTIFICATION CODE

AFX

ARM

NOMENCLATURE	CUR	MODEL	USA OR SER NO	PT	BUMPER NUMBER	NOR DATE	ORG DATE	SPT DATE	RON NO	JOB ORDER OR DON NO	REASON FOR NOR	FSN PART
TANK		M60	9B7644		C12	2230	2230			AB21702	BEARINGS WORN	
TANK		M60A1	9B6887		C24	2255	2255				RECOIL BOLTS	
VTR		M88	9B4662		B70	2236	2236		2237G203		WIRING HARNESS	29207069066
VTR		M88	9B4662		B70	2236	2236		2237G204		HOSE ASSY	25207071223
TRUCK	*	M49C	4E4462		H115	2269	2269				HYDROVAC	
TRUCK	*	M561	03B74971		C7	2269	2269				BEARING	31102896748

The heart of the system lies in RILOS. This is the part that the commanders use. It is delivered to them once a week and gives the commander, in summary form, the current status of every NOR item in his command.

The NOR Time Status chart shows what major items are down and how long they have been NOR. This gives the commander a quick appraisal of where he might devote a little attention, especially when an item appears in the 61-90 column or higher. A prompt defensive gambit often used here is that an item may be down for a hard-to-get part; the *Sheridan* and radio teletypewriter sets used to be the prime examples in this category. While this may be true, there are also a surprising number of cases of extensive NOR time where a requisition has been canceled and not posted nor caught on the monthly reconciliation. There are even cases where the requisition never was submitted although persons assumed it was. There isn't any explanation for this, other than saying such cases are just more extrapolations of Murphy's Rule. Therefore, commanders must not be satisfied with apparently logical, local explanations; rather, they must constantly check further.

The author used to walk into his direct and general support maintenance units and ask to see each radio component listed in shop on RILOS. While this created much scurrying around the first time (several sets had been administratively "lost" and weren't located for a few days), it is to the credit of these units that on subsequent visits they had every set immediately available and a good number either on the bench or ready for pick up. The author also found that the down time in support units was inversely proportional to the frequency of battalion and brigade commanders' visits.

The second part of RILOS shows the commander what item is down by type and bumper number, when it went down, when it was reported to organizational maintenance, when (if appropriate) it was reported to support maintenance, why it is down, and what is being done about it (RON number or job order number).

This information quickly points to any unusual time lags in the maintenance system or if someone hasn't done his part in moving the item to where it can be repaired. A NOR item that isn't reported into organizational maintenance within 24 hours or direct support maintenance within 48 hours has been delayed more than it should be.

This particular example also illustrates a common weakness in any data processing system: the accuracy of input. The data processing machine is essentially a sophisticated idiot; it can do surprising calculations and evaluations after it has been told exactly what to do with what input information. However, the quality of the output will be determined by the quality of the input. Consequently there must be a constant checking system to purge inaccuracies and errors from data processing input.

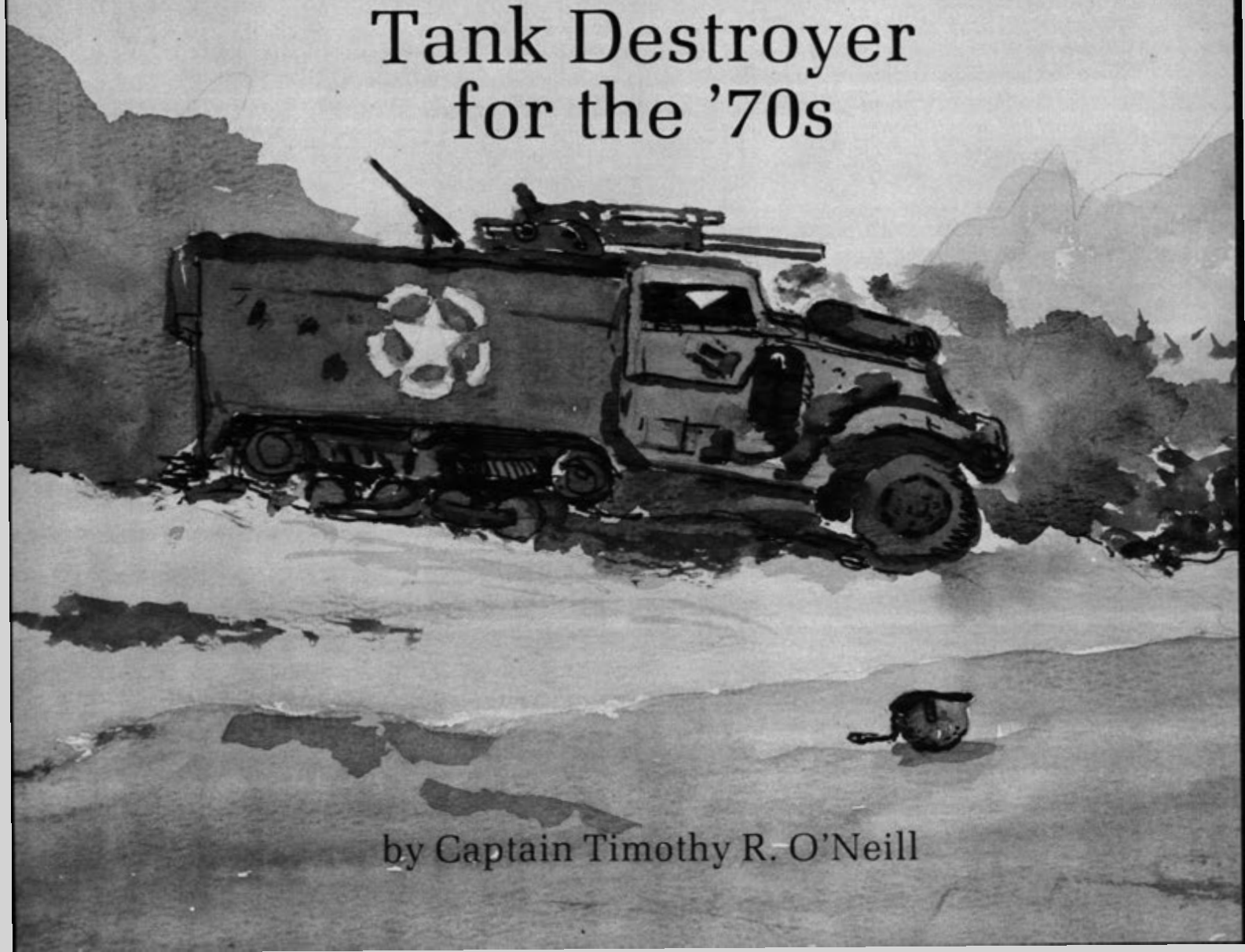
To keep the data up to date, each reporting unit forwards to the direct support maintenance battalion a corrected copy once a week. Data input cards are then revised by direct support personnel and sorted and collated with the master file prior to being fed into the computer system for rerun and printout.

One of the most valuable aspects of RILOS is its use in detecting incipient trends from this regular updating. In the 1st Brigade, 1st Armored Division, for example, the Brigade Commander maintained a chart showing each battalion's equipment status, broken down by type items (combat vehicles, tactical vehicles, communications and avionics, helicopters and other equipment items). By posting each RILOS report, trends in maintenance problems became readily apparent far in advance. Support emphasis could thereby be shifted to a particular unit or particular item until the growing problems were resolved.

The SAMMIS system is not unique in USAREUR; most organizations have similar systems that provide their commanders the same information. The importance of it lies in the fact that it is a technique that gives detailed, accurate and timely information of potential problems to those particular individuals who can do something about solving those problems. And most importantly, the system works.

COLONEL JOHN R. BYERS, a 1951 graduate of the US Military Academy, holds a master's degree in Mechanical Engineering from Georgia Institute of Technology. From 1970 to 1972 he commanded the 1st Brigade of the 1st Armored Division. Colonel Byers is currently assigned to the Strategic Plans and Policy Division, Office of the Joint Chiefs of Staff.

Tank Destroyer for the '70s



by Captain Timothy R. O'Neill

The United States Army needs to review the requirement for a tank destroyer force tailored to the modern battlefield. The advantages in economy of force, particularly with respect to our limited tank resources, and cost-effectiveness both in terms of unit cost and destructiveness per unit, are becoming more evident with each foray into the tank-design arena.

There are two basic problems which could be solved by the fielding of an effective tank destroyer (TD) force. First, the Infantry would be afforded a strong antiarmor tool with the combination of mobility, destructiveness and staying power flexible enough to serve in both the mobile and force-oriented defense postures—without pointless hull-down dissipation of tanks. Second, the design of the main battle tank could be simplified if it could be designed with its primary offensive role in mind.

Yet, there is an ingrained resistance to the tank destroyer in the Army—an uneasy feeling of inadequacy that dates from the 1940s. Why this skepticism persists, and why it is no longer really valid, is essential to an understanding of the tank destroyer's new importance.

World War II produced two species of tank destroyer: the German and the American. Each concept was born out of different needs and experienced different degrees of success.

The German tank destroyer was a specialized outgrowth of two classes of vehicles; the assault gun and the self-propelled gun. The assault gun was a cheap, easily produced casemated weapon which had its genesis in the 1930s. Actually, it filled the role originally specified for the tank—infantry support. Therefore, the limited numbers of more complex turreted tanks could be grouped together for increased clout. This was absolutely essential to the German Army's force structure, and was axiomatic to the type of doctrine which enabled the German forces to overrun France in 1940. In Russia, however, the German mobile units were wading in a sea of enemy tanks by mid-1942 and more and more of their tank resources were being frittered away in the business of tank-fighting. In addi-

tion, the rapid expansion of the force structure, already severely diluted by the armored division reorganization of 1941, was being stretched to the limits by losses. The recuperative powers of the strategically bludgeoned war industry were not equal to the task of producing all the tanks that were needed. Hence, the TD (*Jagdpanzer*) was born. A heavily gunned, heavily armored, casemated vehicle of a defensive nature, it was mounted on a proven tank chassis. Using production techniques which were, compared to those associated with turreted tanks, relatively simple, production could be speeded. Without the constraints of a turret ring, guns could be larger than those on their turreted counterparts. Since the *Jagdpanzer* was to be used defensively, the lack of flexibility of target engagement imposed by limited traverse was acceptable as a trade-off against a gun of longer range and better terminal effects. In fact, the only thing the tank could do better than the tank destroyer was *attack*—and after 1943 even that shortcoming was rather academic.

The experience in the United States was quite different. The TD was basically a cheap tank, and posed far fewer production problems for an army and war industry in headlong mobilization. Unlike the *Jagdpanzer*, the US TD was a lightly armored vehicle; the big gun was there, but the inches of steel were not, and the TD was often turreted. Many separate battalions were formed in their initial flush of popularity, but then they encountered an enemy in North Africa, and proved unworkable.

The fundamental problem was that the TD was a capability in search of a use. Ours was an attacking army, and the defensive TDs went out in search of tanks to destroy. The lesson was not lost in the wreckage at Kasserine. Basically, the armament advantage over the German tanks was not great enough to offset the TDs thin skin. This led to a real doctrinal headache in Europe, when the US was again on the attack. TDs could amuse themselves with aggressive maneuver, but getting the enemy to attack them under favorable conditions was not easy. So the TD declined in Army service, and has not really reappeared since.

So, why a TD now?

THE NEW NEED FOR THE TD

As already suggested, the decline of the US tank destroyer was because the marginal advantage gained by the idea was not sufficient to offset the basic softness of the vehicle. The Army's job then was to attack on all fronts—the defensive vehicle just didn't have a home.

The Army no longer has the option of attacking on all fronts—a sad situation dictated by a modest force structure. Mesmerized for years by the idea of the mobile defense, it gradually awoke to find that even this means of overcoming enemy materiel superiority is going to be very costly in terms of space and people. While the Armor Community has traditionally thought, and rightly so, in terms of the offensive part of an overall defensive posture, so the Infantry, also rightly so, has been toting up the disadvantages of manning a blocking force in imminent danger of becoming a pocket of resistance should Armor's counterattack fail. There was also the nagging doubt that the concept of blocking and canalizing forces would

really be as effective as we would once have hoped—the idea being, like many sophisticated ideas, more readily planned than executed. The blocking force is tied to terrain; as mobility increases, terrain becomes less and less important, and mobility is increasing. This led to the Infantry's romance with the Force-Oriented-Defense (FOD).

But FOD is designed by and for the infantryman. It smacks strongly of the old *Panzer Jaeger* idea, which was odd in 1944-45, but is becoming increasingly attractive as the technological capabilities begin to appear. But what role does the tank play? Despite protestations to the contrary, we see the grim specter of Main Battle Tanks hull-down behind yards of soil, engines cold, waiting for the enemy to come; or, worse yet, piecemealed over the defended zone in the role of pocket fire brigades.

The TD can mean salvation in this respect.

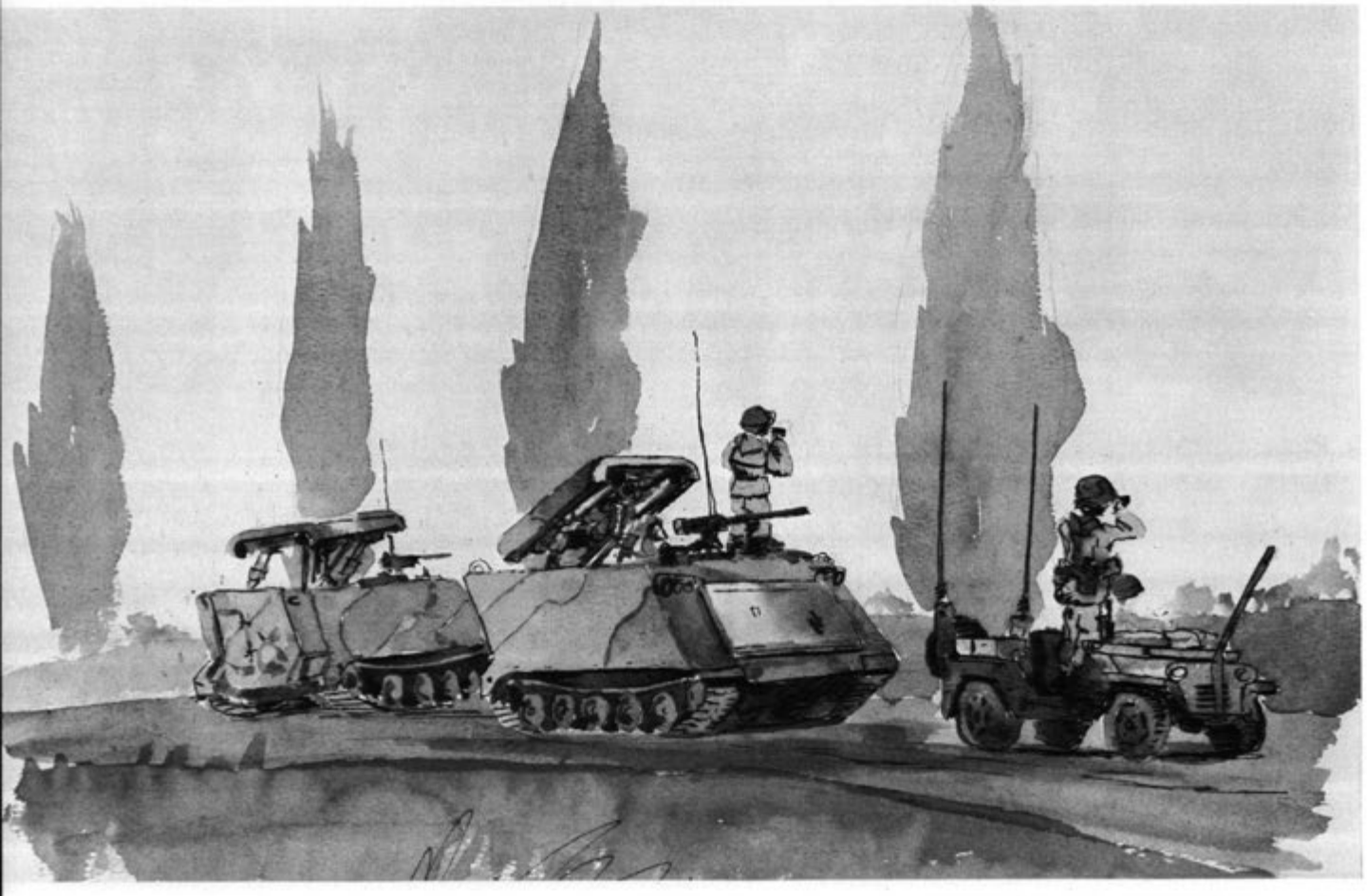
A weapon has finally appeared that provides rationale for the original early World War II TD: the second-generation antitank missiles, such as *TOW*. This provides an armament system that can, when properly employed, offset the lack of protection in the defense.

But *TOW* is, in itself, very problematical. It has the advantages of very long range, phenomenal accuracy, lethality and high resistance to countermeasures. Its limitations are active and passive vulnerability: active, because of its long time of flight; passive, because there is nothing "hard" at all about a fiberglass tube and three infantrymen. If, on the other hand, the best armor known, dirt, is used, the *TOW* loses its mobility and soon becomes an unsupplied part of the pocket of resistance.

The mechanized infantry's *TOW* launcher, essentially a launching tube tacked onto the *M113*, is no answer either. The mobility is there, but to reduce vulnerability the crew will soon develop the habit of emplacing the *TOW* in a prepared bunker. Thus, the *TOW* will become essentially a towed antitank piece, subject to lengthy delays for "limbering" and "unlimbering."

THE *TOW*/TD

The creation of a mobile, relatively inexpensive tank destroyer based on the *TOW* missile and the *M113* carrier would be a big stride toward providing a feasible doctrine for antitank defense. The *TOW*/TD would have to offer all the advantages inherent in the

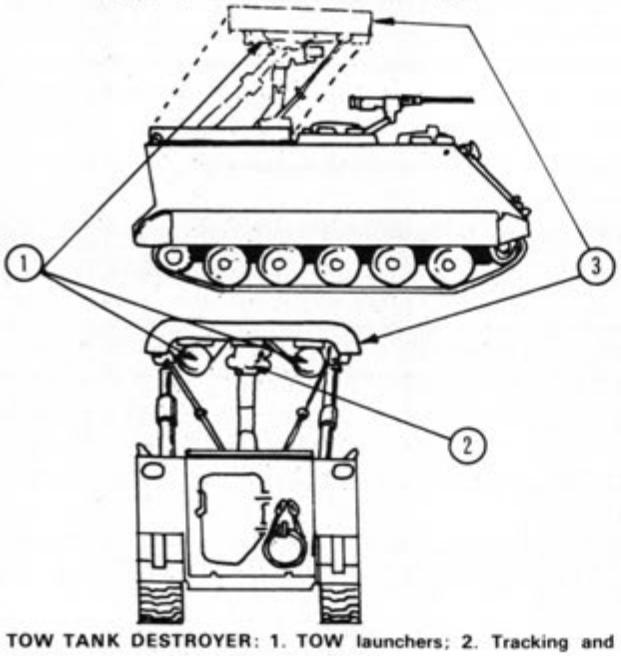


TOW system, while maintaining both mobility and a practical level of protection.

The proposed *TOW*/TD is based on the *M113* for several obvious reasons: it is light, mobile, automotively proven and reliable; it shares common automotive components with most combat vehicles of the mechanized infantry; and it eliminates much of the developmental costs of designing a system from the ground up. Finally, and quite importantly, it is the cheapest available vehicle adequate for the mission.

The *TOW*/TD is designed to be *emplaced*, if at all consistent with tactical demands. It should be as close to hull defilade as physically possible. In this position it is largely invulnerable to K- or M-kills by direct fire. In the manner of mounting the weapon, the *TOW*/TD differs from the current *M113 TOW* carrier. The *TOW*/TD's two launcher tubes are mounted under an armored umbrella to protect the tubes and control package against their present nemesis, overhead artillery burst. The "umbrella" is normally carried flush with the top deck of the carrier, and in fact forms the roof. When engaging targets, it is raised four to five feet by a hydraulic system, and elevation is applied from this same power source by tilting the umbrella. A limited traverse of ±30 degrees is provided by mounting the assembly to a revolving floor plate in much the same manner as the mortar on the *M125* or *M106*. The gunner remains inside the carrier, aiming the system through an articulated optical linkage to the tracking mechanism mounted under the umbrella between the launchers.

This system offers distinct advantages in the manner of engaging targets. Consider a hypothetical engagement viewed from one TD. The vehicle is emplaced with its platoon in a narrow prepared position providing hull defilade. A similar alternate position has been prepared nearby. The positions are carefully sited to provide observation and clear fields of fire. The vehicle is closed and covered with camouflage net to hinder recognition. The driver has dismounted and is observing to the front a short distance away, linked by wire to the crew.



TOW TANK DESTROYER: 1. TOW launchers; 2. Tracking and guidance components; 3. Armor umbrella.

From a treeline some 3,000 meters to the front, three tanks come into view in the TD's sector of fire. The driver/observer takes a quick azimuth—to the center of mass of the platoon, since the tanks are close together—and alerts the gunner of the target, approximate range and approximate azimuth. The gunner can engage the target without this, but experience has shown him that he can greatly reduce exposure by laying a rough azimuth while the umbrella is still low, then popping up to get a precise lay and fire. This he does, and since the tanks are caught by surprise, the first missile scores an "easy" kill.

But the tanks are smarter now, one is partially hull-down and the remaining one is heading for a small group of trees. The gunner chooses the moving one, which is now laying a dense smoke screen. Just before it reaches cover, the second missile strikes it in the rear above the smoke cannisters, igniting the extra fuel drums.

The gunner pulls back the RELOAD lever, and the umbrella tilts backwards for fast reload, allowing the loader to ram in two new missiles from the side racks. (Under heavy fire, he can lower the umbrella all the way and load from the inside, but this method is faster.) "UP!" and the gunner swings the umbrella again into firing position.

By now the last tank has brought the TD under fire, but it is still at a range of nearly 3000 meters and the fire is not accurate. The enemy gunner has spotted the smoke of launch and glimpses briefly the movement of the umbrella to reload. An HE round detonates in the earth glacis directly in front of the TD, scattering soil and shreds of camouflage net; but at that range, the exposed portion of the TD is not really in much danger. After two shots, the tank withdraws into turret defilade to await the arrival of the rest of its company and prepares to call in its supporting artillery fires.

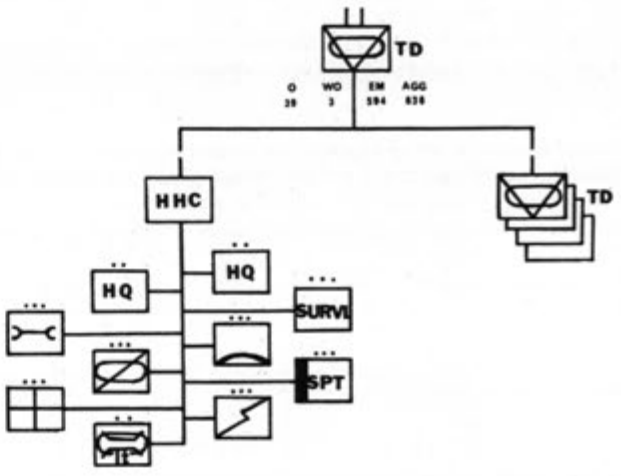
ORGANIZATION AND THE STRONGPOINT

The TD unit is about to be introduced to the heavy artillery barrage, and an important part of surviving such a countermeasure is the doctrine and the organi-

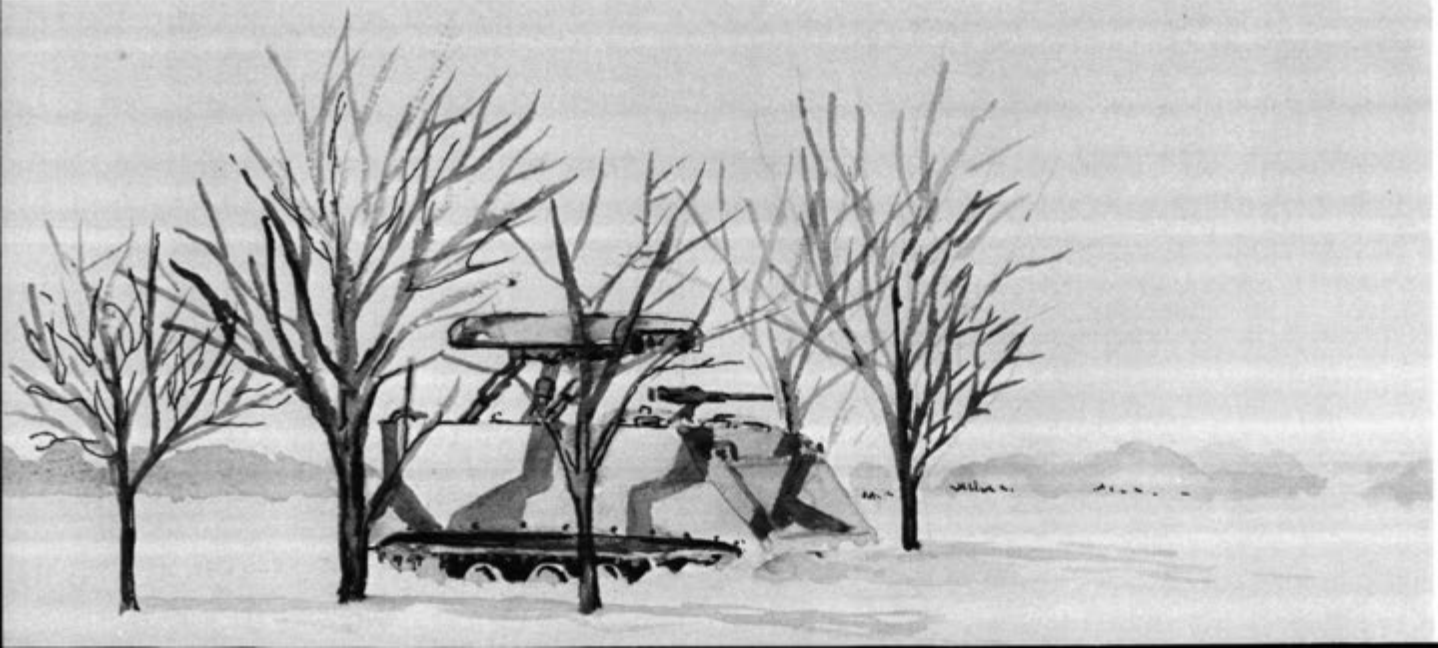
zation fashioned to support that doctrine.

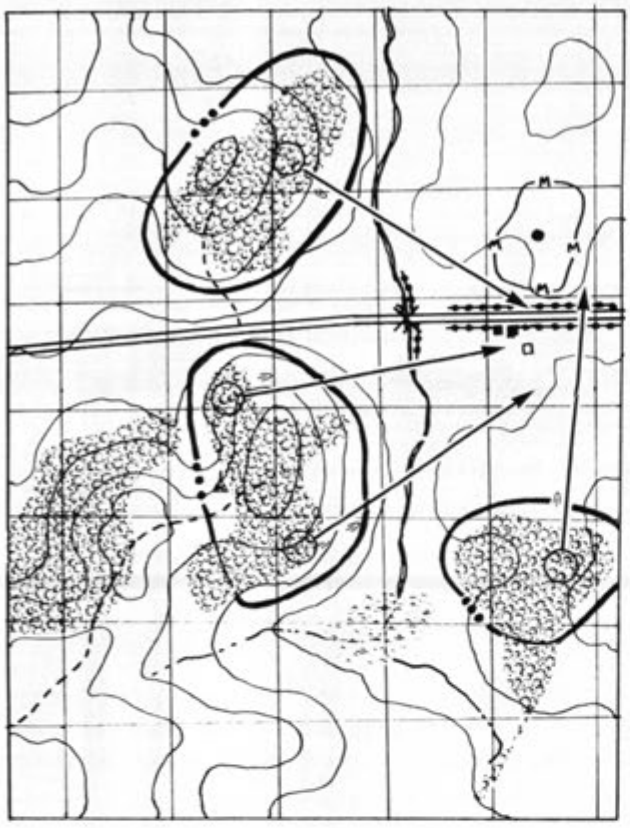
The basic antitank building block, whether in the mobile or force-oriented defense, but especially in the latter, is the strongpoint. A single *TOW*/TD would suffer the inherent weakness of a single anything on the battlefield—loneliness. Just as the gunner of a TD might find himself under fire by a tank which has maneuvered close enough to bring accurate fire, so any single antitank weapon is useless without mutually supporting weapons. The platoon is thus organized as a potential strongpoint, in this case, four vehicles. The inherently high automotive reliability of the *M113* suggests that at least three can be available at most times, and three can be a self-supporting dispersed strongpoint. The dispersed strongpoint's survivability under conventional or nuclear bombardment is helped by the 3,000-meter range of the *TOW*; TDs can be self-supporting without being bunched up. This, combined with the umbrella and emplacement method, makes the strongpoint hard in the sense of its passive protection and hard in its lack of definition from the targeting point of view. In essence, each separate vehicle must be dealt with separately, an unpleasant and time-consuming task.

The TDs are only part of the dispersed strongpoint. Close-in support is provided by the mechanized infantry unit to which the TD strongpoint/platoon is attached. Antiaircraft support is provided by detachments from the ADA battalion of the division and by battalion *Redeye* sections. Defensive fires are on call from 155mm and 8-inch howitzer batteries in direct and general support. The enemy's counterbattery is considerable, but will be largely occupied with reduction of strongpoints. In addition, to the front of and interspersed with the strongpoints are minefields and obstacles, carefully emplaced antitank defenses if time permits, or more hastily deployed air and artillery scatterable minefields. When the enemy deploys to breach these obstacles, they will find themselves under fire from the TD-based strongpoint. TDs are the backbone of this defense. They engage the enemy from extended ranges, forcing him to deploy unfavorably in the face of defensive fires, minefields and obstacles.



For this reason, the strongpoint platoons are configured to be as nearly self-contained as possible, indeed their tactical allegiance may shift continually under a concerted, multiaxis attack. It almost seems that the battalion is made to be broken up. This is true and it isn't at the same time. The temptation to assign TDs at a lower level (such as a platoon at mechanized battalion) is avoided, as this would remove much of the flexibility gained by having a separate force responsive to the division commander. One approach is to assign one or two TD battalions to the mechanized division in lieu of some of its tank battalions. This would retain at least part of the offensive capability of the division while inestimably increasing the defensive potential. But deployed at battalion level, the only result would be that the TDs would be left holding a thin line all over the zone rather than being capable of concentration at critical points. In essence, the unit is most logically placed at the higher level to promote economy of force and mass.





DISPERSED STRONGPOINT

Note: Arrows show orientation of weapons, not ranges.

CONCLUSIONS

Adoption of a simple, reliable, relatively low-cost and potentially high-density tank destroyer capable of filling the defensive roles now assigned to tanks could be a substantial boost for both mobile and force-oriented defense. As it is now used, the *TOW* can be neutralized by its extreme vulnerability to enemy fire. Combined with adequate protection and a viable tactical approach, the *TOW*/TD can be a defensive advantage far out of proportion to its modest cost.

CAPTAIN TIMOTHY R. O'NEILL, commissioned fom The Citadel in 1965 and a 1969 graduate of the Armor Officer Advanced Course, is currently assigned as a project officer at the US Army Armor and Engineer Board at Fort Knox.

MEET

THE

M60A2

by Major David N. Bockoven

With the acceptance of the *M60A1E2* (type classified Standard A and redesignated the *M60A2*) for production in limited numbers to supplement the *M60A1*, the Army has given the green light to tankers around the world for entrance into the age of sophistication. No longer can they live by the old adage "keep it simple stupid" and expect to have a combat capability greater than that of their adversaries. The *M60A2* provides such a system.

To gain some appreciation of the capabilities of the tank, compare the *M60A2* and the *M60A1* on a turret to turret basis, for the hulls are basically the same except for minor modifications.

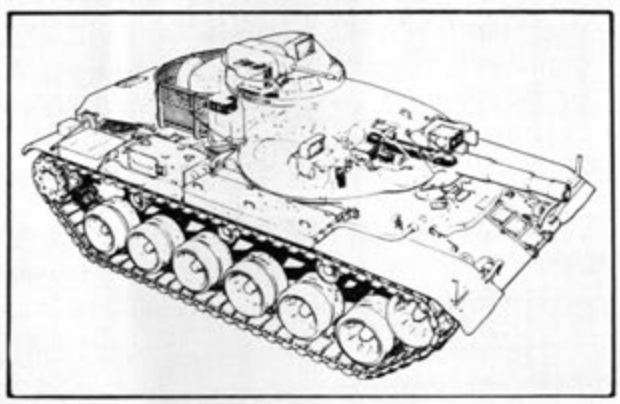
The *M60A2* is equipped with an electro-hydraulic stabilization system which inertially stabilizes the turret, cupola, main gun and cupola mounted machine gun. The stabilization system corrects for angular motion only. With respect to the target, the translation of the tank is not accounted for and must be corrected by gunner input. The stabilization is, therefore, gunner assisted when firing the main weapon. With this system, the tank can fire its main weapon, by either gunner or commander, while on the move. Inherent in the system is the capability enabling surveillance through the fire control instruments while the tank is moving. Additionally, the commander has a target designate system whereby he can slew the turret from under him and move the gunner's sight to within 5 mils in azimuth and 5 mils in elevation of a target he wishes the gunner to engage. Or conversely, he can slew the cupola to the main gun with his sight being aligned to the main gun within 0.1 mils in azimuth and 0.25 mils in elevation.

However, the question remains: can a gunner hit

CAPABILITY COMPARISON

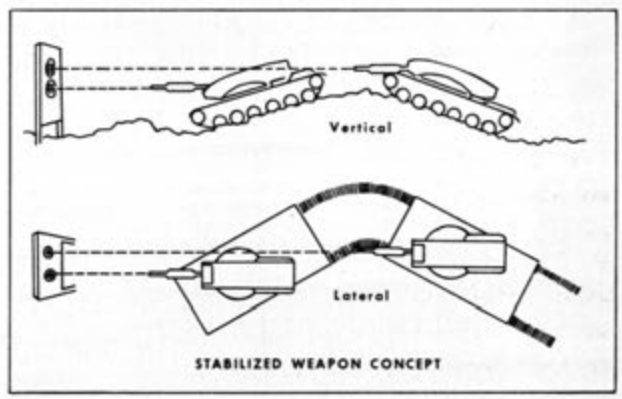
	M60A2	M60A1
MAIN ARMAMENT	Missile with long range accuracy plus conventional round.	Conventional rounds
STABILIZATION AND CONTROL	Fire on the move with main gun stabilized. Commander's station and machine gun separately stabilized. Power operated cupola.	None currently: Add-on system under development, main gun only. Manually operated cupola.
NIGHT VISION	Passive sights at gunner's and commander's station.	Active sights for use with IR searchlights.
TARGET ACQUISITION	Automatic designation of target from commander's station to gunner and main armament.	Requires verbal designation and/or commander control of main gun.

what he is aiming at? With the *XM19* ballistics computer system, first round hit probability using conventional ammunition is greatly enhanced. This system determines reticle elevation and deflection corrections necessary for specific target range, ammunition type, drift, gun jump, parallax, vehicle cant angle and crosswind velocity—the latter being manually inserted after determining the wind velocity from some outside source. The computer provides the required signals to the optical sights for the necessary reticle alignment. An additional feature of this system is automatic target lead which eliminates the false lead problem. With the reticle properly positioned in accordance with the computer ballistics solution, the gunner can aim the main gun by placing the crosshair on target and proceed to fire a conventional round. However, if either the target or the firing tank is moving, it is possible to establish the proper lead based upon target movement, tank movement or a combination of both. As the gunner tracks target movement, a lead switch is engaged and then disengaged. The rate at which angular displacement takes place during the switching interval is processed by the ballistics computer to program target lead positioning of the periscope reticle. When the turret is in stabilized operation, the computer solution will be applied to the gun as opposed to the periscope reticle. In either case, proper lead is applied and takes all of the guess work out of the system.



All this would be to no avail and almost meaningless if there were no way to accurately and quickly determine range to a target. Range determination is made simple by the use of the laser rangefinder. This system uses a pulse of reflected laser light to ascertain the distance to a target. Range is determined by transmitting a pulse of laser light, receiving the light reflected from the target, and converting the time from transmission to reception into range. This target information is fed automatically or manually into the ballistic computer to obtain the necessary superelevation. When combined with the information previously discussed, it provides the required reticle alignment. The speed of light and a ± five-meter possible error give an indication of the speed and accuracy of the system.

Up to this point, only conventional ammunition has been considered. However, the *M60A2* also has a missile-firing capability basically the same as the *M551 Sheridan*, consisting of the *Shillelagh* guided missile and its guidance and control system (G&C). *The Shillelagh* missile is a fin-stabilized guided missile which is electrically fired from the same 152mm gun launcher used for conventional ammunition. The missile is stabilized in roll attitude and capable of maneuvering in pitch and yaw (vertical and horizontal movement) in response to commands received from the G&C system mounted on and in the tank. The basic function of the G&C system is to constrain the missile to fly along the gunner-generated line of sight (LOS) between the launching vehicle and the target until impact. To ac-



STABILIZED WEAPON CONCEPT

complish this, the G&C system measures the missile deviation from the LOS coupled with the tracking rate, determines the required correction, and then transmits the correction to the missile. In essence, all the gunner has to do is keep his missile reticle cross hair on the target and he is assured a target hit. From limited testing, it has been determined that the missile can be fired from a moving vehicle. However, extensive testing has not been accomplished in this area in order to prove the validity of this technique.

As can readily be seen from this brief description of the *M60A2*, Armor has taken a step in the right direction. The *M60A2* is not the final solution, just a beginning. The experience plus the combat capabilities that will be gained when the vehicle is finally fielded cannot help but further increase overall combat readiness.

MAJOR DAVID N. BOCKOVEN is currently assigned as S3 of 1st Battalion, 67th Armor, 2d Armored Division, the unit which is conducting the Intensified Confirmatory Troop Test (ICTT) on the *M60A2*.

1973 Veteran's Associations Annual Meetings

1st ARMORED DIVISION
17-20 August, Boston, MA
Gus Mueller, 16 Houghton St., Hudson, MA 01749

2d ARMORED DIVISION
26-29 July, Louisville, KY
PO Box 8116, Wainwright Station, San Antonio, TX 78208

3d ARMORED DIVISION
25-28 July, New Orleans, LA
38 Exchange St., Lynn, MA 01901

4th ARMORED DIVISION
19-21 July, Philadelphia, PA
Samuel A. Schenker Sr., 2440 Victoria Dr., Sharon, PA 16146

5th ARMORED DIVISION
9-11 August, Fort Lauderdale, FA
8549 Lowell St., St. Louis, MO 63147

6th ARMORED DIVISION
25-28 July, Kansas City, MO
Edward F. Reed, PO Box 492, Louisville, KY 40201

7th ARMORED DIVISION
15-18 August, St. Louis, MO
PO Box 6, Spring Glen, NY 12483

8th ARMORED DIVISION
28 June-1 July, Atlanta, GA
Henry B. Rothenberg, 134 N. La Salle, Room 400, Chicago, IL 60602

10th ARMORED DIVISION
31 August-3 September, Atlanta, GA
James V. Revell, 10433 SW 99th Terrace, Miami, FA 33156

10th ARMORED DIVISION (Western Division)
31 August-3 September, Los Angeles, CA
Dr. I. Lee Naftulin, 1932 Overland Ave., Los Angeles, CA 90025

11th ARMORED DIVISION
15-18 August, Pittsburgh, PA
2328 Admiral St., Aliquippa, PA 15001

12th ARMORED DIVISION
16-19 August, San Francisco, CA
Leonard P. Dooley, PO Box 33, La Salle, IL 61301

14th ARMORED DIVISION
27-29 July, Niagara Falls, NY
William C. Hodge, 57 Winstead Rd., Lackawanna, NY 14218

16th ARMORED DIVISION
9-12 August, Chattanooga, TN
629 Marlboro Ave., Chattanooga, TN 37412

1st CAVALRY DIVISION
2-5 August, El Paso, TX
Bert C. Wright, 8504 Turrentine Dr., El Paso, TX 79925

6th CAVALRY REGIMENT
15-17 June, Chattanooga, TN

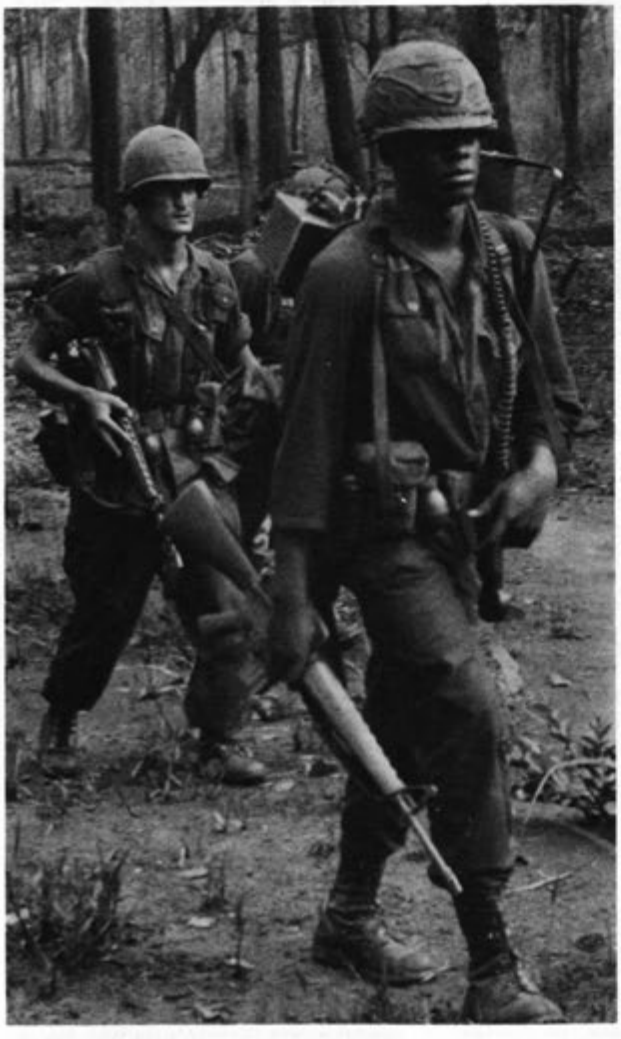
112th CAVALRY REGIMENT
11-12 August, Dallas, TX
PO Box 112 C, Cedar Hill, TX

short, over, lost, or ... TARGET

This department is a range for firing novel ideas which the readers of ARMOR *can sense and adjust. It seeks new and untried thoughts from which the doctrine of tomorrow may evolve. Items herein will normally be longer than letters but shorter and less well developed than articles—about 750 words maximum is a good guide. All contributions must be signed but noms de guerre will be used at the request of the author.* ON THE WAY!!

Towards More Equal Opportunity

by Captain John C. Speedy III



Hostile firepower may not be the most lethal means of demolishing a fighting unit, for a physically mauled unit is easily recognized as such. A unit torn by racial tension may be as militarily inept yet superficial appearances greatly complicate recognition of the problem. In both cases, the unit must be rehabilitated by the commander, although in the case of the war-torn unit, more outside help is normally available. Here lies the weak link in the military approach to racial harmony in troop units: the commander is expected to solve racial and minority problems far beyond his span of experience.

Certainly, there is much an aggressive commander can do to solve racial conflicts. He can discipline personnel of all races who practice racism, open lines of communication, personally practice equal opportunity policies and so forth. In other words, commanders can create an atmosphere conducive to racial harmony. In the vast majority of units, such an atmosphere has been the objective of command policy for years. The fact that some commanders have achieved such an atmosphere in their units proves the goal to be anything but utopian. However, there are limitations inherent in such an approach to the racial problem. The carefully cultivated atmosphere of racial harmony merely provides a medium in which mutual respect and trust may be fostered. However, it does not eliminate one basic root of racial discord—varied educational backgrounds.

Before a soldier with a disadvantaged background

reaches a unit where he must compete for advancement on a full equality basis, he must be afforded the opportunity to make himself equal. The battery of tests administered to newly enlisted soldiers should be used for two purposes: first, to help determine the specialized training appropriate for the soldier; and second, to help identify educational deficiencies. When data from testing and other basic information is correlated, the soldier entering the service with a weak educational background can be identified.

Once it is determined that a soldier is being held back by poor education, he should be diverted from service in troop units for a period of one year during which he could reinforce his basic skills in a permanent educational facility organized and staffed for this purpose. The first six months of instruction would consist of an intensified general educational program including electives, and would strive to bring all personnel up to certain minimal achievement levels. During the second six months, students would develop identified aptitudes for retesting and ultimate military application. In this manner, military education and training could go a long way toward creating actual, rather than rhetorical, equal opportunity.

Soldiers who improve themselves and successfully compete to achieve their goals would have greater pride in themselves and the Army. Confidence in the Army would be fostered in the knowledge that high professional standards were being rigidly applied to military skills. Mutual confidence and respect among soldiers would have a strong foundation on which to develop, for all men would enter troop units as fellow professionals on a more equal footing. What commander would not benefit from such replacements? Yet, the obstacles to this educational system are formidable.

Conservative reaction to the plan may see it as yet another diversion of resources from the traditional mission of closing with and destroying the enemy. The Army is certainly not an ideal vehicle for social reform and any attempt to remedy deficiencies imposed on men by their society is a most complex undertaking, demanding large scale expenditures as resources grow more scarce each year.

The Army has inherited a massive social problem which demands bold and immediate action. Our response to a serious human problem must be as determined as our response to a new hostile weapon system. In the final analysis, the human problem may well be more lethal than the materiel threat. A powerful new approach to the racial problem was overdue yesterday. Only high quality personnel can make this approach to military education effective. The talent is readily available within the range of current government salaries.

The mass Army of World War II no longer fits our defense needs, but a racially harmonious active force is essential to our national interest. Consequently, declining enlistments in reserve forces should be allowed to continue until substantial reductions are realized. The appropriated funds thereby released should be used to support intensified education and training for the disadvantaged soldier who gives full time service to his country.

No educational program can provide a panacea for racial friction, but it can go a long way toward making the Army a social institution for the nation to emulate.

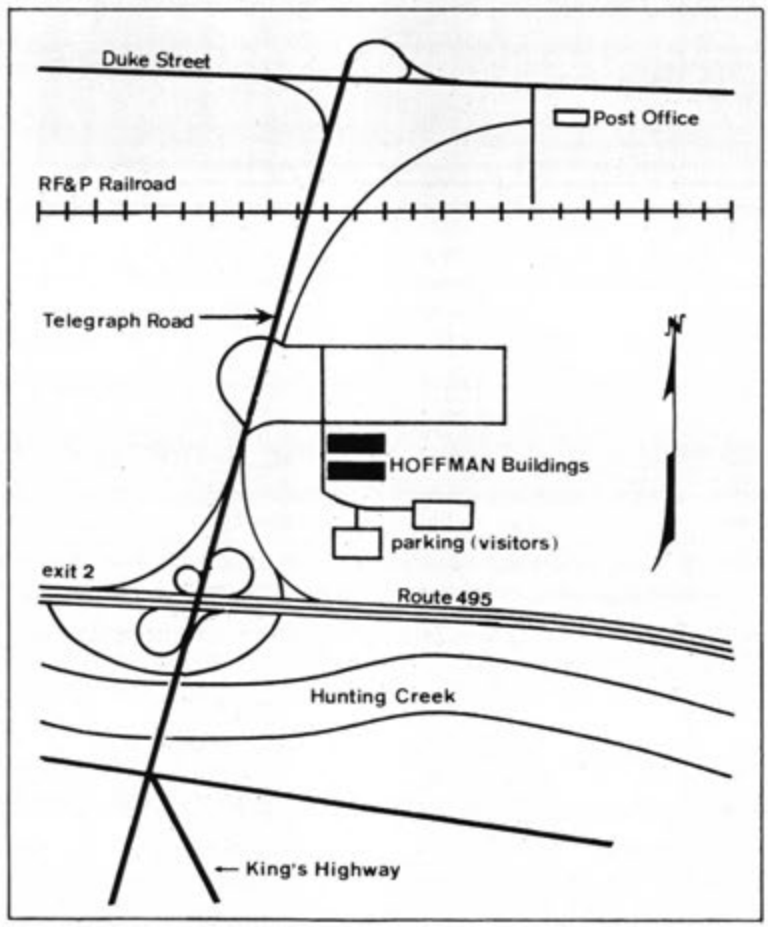
CAPTAIN JOHN C. SPEEDY III served with the 3d Squadron, 11th Armored Cavalry Regiment in Vietnam in 1968 and 1970. He is presently studying for a master's degree in military history at Duke University, and has been selected to attend the Command and General Staff College.

from the Armor Branch Chief

Branch Move

Our much-heralded and long-anticipated "TEMPO—BREAKOUT" occurred in the waning hours of 21 March 1973. Violent execution and even more violent language characterized the actions of your Branch as it seized and consolidated the sixth floor, northwest corner of the Hoffman II Building. A jump CP was carefully organized to insure uninterrupted coordination and liaison with the field during our operation, but a swift counteroffensive by AT&T temporarily disrupted our communications. We therefore apologize for any inconvenience you may have incurred. Our mission accomplished, we submit the following intelligence for your utilization and dissemination:

NEW MAILING ADDRESS
HQDA (DAPO-OPD-AR)
200 Stovall Street
Alexandria, Virginia 22332
Free visitor parking is available.



NEW TELEPHONE NUMBERS

ARMOR BRANCH CHIEF	
Colonel Paul S. Williams Jr.	325-7832
ASSIGNMENT SECTION	
LTC Robert W. Mills (Ch, Asgmt Sec)	325-7833
LTC Thomas H. Tait (LTC Assignments)	325-7835
MAJ William A. Fitzgerald (MAJ Assignments)	325-7835
LTC Warren J. Walton (Aviator Assignments)	325-7839
MAJ Richard A. Behrenhausen (CPT Assignments)	325-7841
MAJ Edward W. Shaw (LT Assignments)	325-7841
Mr. James Harrison (New Accessions)	325-7841
PERSONNEL ACTIONS AND EDUCATION SECTION	
COL William F. Coad (Branch XO and Ch, PA&E)	325-7834
MAJ Donald F. Borden (Gains: RA Pgm, Branch Trf, Extensions, Recall & Direct Apptmts; Losses: Resig, Retirements, REFRAD & Eff Rep)	325-7845
MAJ Gordon R. Sullivan (Sr Education: Grad Sch, DCP, CGSC & Specialist Pr)	325-7837
MAJ Rodney D. Wolfe (Plans, Programs and Promotions)	325-7839
Mrs. Agnes Burns (Jr Education: AOAC & OUDP)	325-7837
ADMINISTRATION SECTION	
Mr. Fred Benegalia (Ch, Admin Sec)	325-7843

For Autovon calls, dial 221 and the last four digits of one of the above listed numbers. For commercial calls, our Area Code is 703.

Last Vietnam Tours

In early January 1973, Armor Branch received a large number of emergency requirements for Vietnam which required us to alert many of our officers on short notice for involuntary short tours. I am aware of the personal inconvenience, financial problems and family hardships undergone by these officers as a result of this action. I was particularly gratified to note the selfless and uncomplaining manner in which they responded during this period of uncertainty prior to cancellation of their orders. The professional "can do" attitude they displayed was a credit to each officer and Armor. I would like to assure each of them that Armor Branch does notice and appreciate such devotion and understanding. We at Branch salute them and wish each luck in their future endeavors.

I would also like to extend a hearty welcome home to Captains Johnnie L. Ray and George K. Wanat, Armor, who were captured in RVN during April 1972 and were released with the first American POWs in February 1973. Mrs. Ray visited Branch several months ago, stating that her husband had suggested she contact us if she needed assistance. She was a courageous young lady who will always be an inspiration to this office force.

Review of Records

Some officers may not be aware that two separate 201 files are maintained in the Washington area on each officer on extended Active Duty. The official 201 file is maintained by The Adjutant General (TAG) and an unofficial file is maintained by Armor Branch. Most of the information in the TAG file is duplicated in the Branch file; however, the possibility always exists that some pertinent data contained in the Branch file is not in your official file.

Since the official file is the one reviewed by boards for promotion, school selection and various personnel actions, it is to your advantage to review your official TAG file and Armor Branch file at the same time. Both files are available in the Hoffman II Building. Armor Branch does not require notification of your visit; however, TAG desires at least two days advance notice, but can respond in two hours for special cases. To make TAG appointments, call Autovon 221-9618 or 221-9619; commercial (202) 325-9618 or 325-9619, or write The Adjutant General, DAAG-PS, Hoffman II Building, 200 Stovall Street, Alexandria, Virginia 22332.

Army Orientation Training

It is time again for Armor and Cavalry unit commanders to discharge a major responsibility in the officer acquisition system—that of accepting cadets from the Military Academy and the Reserve Officer Training Corps into your units for a month of orientation and training. This year there will be 1,650 such cadets, approximately 1,100 from USMA and 550 from ROTC, which will permit all TOE units to host one or more cadets.

Previous experience discloses that these young men will regard their time spent in the units as the most important single item in preparing them for Active Duty. They will be extremely responsive to challenging assignments and commensurately less rewarded if their duties consist simply of observing or assisting other officers. With your wholehearted support of this program, each cadet should be provided a valid leadership experience plus first hand knowledge of the duties and responsibilities of a junior officer in the Army. Thus Armor Branch and the Army will be paid dividends in future years directly proportional to your efforts when these young men return to serve with us as commissioned officers.

Handicapped Services at Fort Knox

A recent letter from Mrs. George S. Patton provided Branch with enlightening and encouraging information regarding handicapped services available in the Fort Knox area. A survey conducted under the auspices of the Army Community Service disclosed that Fort Knox offers the best overall CONUS program of contact, referral and placement for handicapped dependents of any age or disability.

The competent and professional services being rendered to 112 military and retired service families range from on-going information and education to in-depth evaluation and therapy. Treatment and assistance have been provided for various categories of mental retardation, cerebral palsy, hearing, sight and speech impairments, muscular distrophy, dyslexic, epileptic, perceptually handicapped, and cystic fibrosis. Adult services geared to the needs of war-wounded are also offered, with guidance for newcomers often provided by handicapped Active Duty personnel.

Cooperation with the post schools and hospital in this important "crusade" has been excellent. As an example, the Fort Knox School Board recently budgeted $30,000 for a new staff to develop a full program for educable mentally retarded junior high and high school children.

Important strides in the field of formal social work education have also been made at Fort Knox. Numerous agencies on post have combined their efforts with the University of Kentucky to initiate training on the baccalaureate level, with graduate degrees an eventual possibility. The first class in this program has begun, and the students include housewives, officers, civilians and other post personnel. The dedicated efforts being made at Fort Knox merit our full admiration and attention. I highly encourage any member of the Armor Family who may have a special interest in the opportunities available to direct specific inquiries to:

The Handicapped Services Center
Army Community Services
Fort Knox, Kentucky 40121

How Would You Do It?

SITUATION:

You are an armored cavalry platoon leader in an armored cavalry squadron. Your platoon is participating in an armored cavalry squadron's advance guard mission for an armored division conducting a movement to contact. The squadron's organic air cavalry troop is presently detached from the squadron. Because of the rapidly moving situation, you initially elect to move your vehicles by alternate bounds, even though the terrain to your front is known to be potentially hostile. You were briefed earlier that enemy air in this area is a definite threat, and you, therefore, briefed your platoon to continually be alert to detect early any enemy air activity. Because of this possible air threat, your platoon has two 20-mm Vulcan ADA squads in direct support. Everything seems to be proceeding on schedule—several small areas of enemy resistance have been quickly overcome; you instruct your driver to halt among some brush that gives you good concealment, and you signal other vehicles to move as your bounding movement progresses.

PROBLEM:

As one of your platoon vehicles crosses an open area, you momentarily see a flicker . . . a reflection? . . . on top of a distant tree line, approximately 2,500 meters distant. Almost simultaneously, your ears are filled with a resounding concussion as you watch the vehicle in the clearing explode from an impacting missile. You immediately signal your platoon to disperse, and seek concealment and defilade behind available terrain. You are all too aware that the division is rapidly moving forward behind you; that your mission remains to ensure their uninterrupted advance. Yet, what kind of antitank weapon is being employed against you that has such accuracy, and from all appearances, is located in the tops of trees? You have a mission to accomplish . . . how would you do it?

SOLUTION:

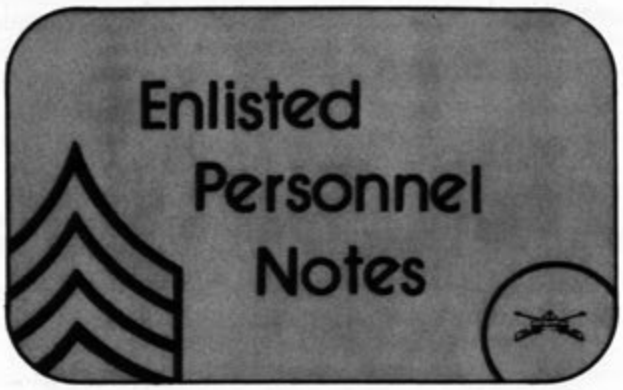
It should take you but 1 second, considering the situation described, to realize that your platoon is under attack by enemy attack helicopters, and your higher headquarters should be notified at once. You should send your report and immediately deploy your M114's with their .50 caliber machineguns or 20-mm guns even farther forward to seek out the enemy helicopters. Your direct support ADA vehicles would be employed where they could best overwatch your remaining vehicles if it were necessary for them to traverse open terrain; if open terrain could be avoided, you would do so. You would instruct your mortar section to commence firing on order, into areas you suspect attack helicopters may be awaiting your approach; tree lines or terrain features that offer concealment, to helicopters, from 2,000 to 3,000 meters, should be suspected. Organic division artillery assets could be requested to aid in this role of "prepping" suspected areas. Immediately request air cavalry troop support to screen to your front and flanks at a distance of 2,000-4,000 meters, in order to detect any lurking enemy attack helicopters. *Continue your mission.*

AUTHOR: CPT FRANK CARSON

ILLUSTRATOR: OSCAR VILLANUEVA

DISCUSSION:

Expert knowledge of attack helicopter tactics, techniques, and philosophy will be the most important asset that the armor unit commander will have in countering and defeating a significant enemy attack helicopter threat. The helicopter tactics of "nap-of-the-earth flying," "stand-off firing," and "sneak and peek (stealth), observation techniques" must be thoroughly understood in order that their effectiveness against the armor unit can be reduced or eliminated. It is imperative that the unit commander know the maximum effective range of the weapon system(s) being employed against him; a careful map study of possible ambush positions at a range approximating this maximum range will enable him to predict accurately these likely ambush positions. The attack helicopter strikes from stealth. The armor unit commander must understand he will not normally see attack helicopters silhouetted above the skyline; observation techniques, when performing reconnaissance for attack helicopters, should approximate those observation techniques normally used when looking for camouflaged and well-concealed *ground* vehicles. One should also look for bright or reflective surfaces (windshields), and for the glint of dynamic rotating parts (rotor system). Against a helicopter threat, one should avoid open terrain as much as possible, and use the cover and concealment of trees, vegetation, and terrain. Again, a careful map study will determine the most likely positions from which armored vehicles could come under helicopter attack, and these likely positions should have preplanned artillery fires placed on them in advance. One must remember that dusty or snowy terrain will often reveal the presence of attack helicopters. The armor unit commander should bring forward his supporting antiaircraft vehicles to accompany his lead elements, and should use them in an overwatching role whenever his movement could be jeopardized by antitank helicopters. Without question, a good defense against the antiarmor helicopter would be to use air cavalry assets to augment the reconnaissance capability of the ground unit, at points of possible attack, both to its front and flanks.



From the Director of Enlisted Personnel

DRILL SERGEANT ASSIGNMENTS

The drill sergeant is the living image of the Army during the formative weeks when the trainee is transformed from civilian to soldier. The drill sergeant builds the foundation upon which the soldier will succeed or fail during the remainder of his military life. The responsibilities are great! These responsibilities include developing leadership, motivation, morale, esprit de corps and professionalism in the trainees in Army Training Centers. The challenge, responsibility and rewards of drill sergeant duties may be yours if you can measure up.

The Army needs drill sergeants! To qualify, you must be an NCO in grades of E5 through E7. Women's Army Corps personnel in grades of E4 through E7 are eligible to become a drill sergeant and may be accepted in the Drill Sergeant Program.

Other qualifications include:

- Fluent in English
- General Technical Aptitude Area (GT) score of 100 or higher. Depending on other qualifications this score may be waived to 90.
- High school graduate or equivalent
- For male personnel, must score at least 300 on Physical Combat Proficiency Test (PCPT). Weight must be within limits as prescribed in Table I, App III, AR 40-501. Maximum physical profile allowable is 111221.
- For female personnel, physical condition must clearly indicate you can perform duties of a drill sergeant. Weight must be within limits as prescribed in Table II, App III, AR 40-501. Maximum physical profile allowable is 111221.
- Good military bearing, leadership ability, no signs of emotional instability and no record of disciplinary action which would adversely affect your ability to perform as a drill sergeant.

WAC personnel serving in CONUS may apply for drill sergeant duty at any time during their tour. Applications from male personnel must be submitted prior to completion of his first year of current CONUS assignment. All personnel serving in oversea commands should apply before or during the eighth month prior to their Date Eligible for Return from Overseas (DEROS). Early application is needed to provide for complete processing prior to return to CONUS. Applications will be forwarded from the installation directly to DA attention: DAPC-EPC-CI. Approval of the application means attendance at one of the Drill Sergeant Schools for six weeks of special training. Schools are located at Fort Ord, Fort Knox, Fort Polk, Fort Leonard Wood, Fort Dix and Fort Jackson.

Upon successful completion of the school you will be awarded the drill sergeant MOS-OOF. Once you are awarded this MOS you start receiving an extra $75.00 Special Duty Assignment Proficiency Pay per month while serving in an authorized drill sergeant position. In addition, you are issued supplemental uniforms, which are laundered and cleaned free of charge, the distinctive drill sergeant hat and badge. Also, you can look forward to a stabilized tour of at least 24 months with an option for extension to 36 months.

If you think you can measure up, submit your application in accordance with Section XV, AR 614-200. A true copy of your DA Form 20 must accompany each application. Your personnel officer will assist you in submitting your application.

COMPASSIONATE REASSIGNMENT STABILIZATION

The maximum authorized stabilization period for compassionate reassignment is one year. Not all compassionate reassignments authorize this maximum period, and in a few cases, no stabilization is authorized. After approval at Headquarters, Department of the Army (HQ DA), the assignment instructions directing a compassionate reassignment will specify the period of stabilization or the lack thereof.

Commanders and custodians of Military Personnel Record Jackets (MPRJ) are reminded that the Assignment Eligibility and Availability (AEA) code "U" must be reported on DA Form 1-1 in accordance with rules 35 and 36, table 5-3, AR 640-2 (Qualification Records and Management Data Reporting) for approved stabilizations in conjunction with compassionate reassignments. The AEA code "U" remains in effect until the specified stabilization period ends, then it is automatically withdrawn. If the individual's problem for compassionate reassignment is resolved prior to the end of his stabilization period, the custodian must immediately withdraw the AEA code "U" and enter an appropriate AEA code. Individuals receiving permissive reassignments are not stabilized and their eligibility for reassignment, especially foreign service, does not change. They will be reported in the appropriate AEA code during the permissive assignment period.

ENLISTED CIVIL SCHOOLING UNDER NEW MANAGEMENT

Due to a recent reorganization, the Enlisted Undergraduate Training and Degree Completion ("Bootstrap")

Programs are now being managed by the Education/ Professional Development Division (DAPC-EPC-E) of the Assistant Directorate for Enlisted Career Management, Enlisted Personnel Directorate. This transfer of responsibility is intended to increase the Army's ability to handle the professional soldier's civilian educational needs.

These two programs remain unchanged by the creation of the new office. The Enlisted Undergraduate Training Program continues to consist of two years of college at Army expense. However, this program is restricted to four disciplines—ADPS, Business Administration, Engineering and Law Enforcement. Although the needs of the Army limit the number who are selected for enlisted undergraduate training, qualified individuals are encouraged to apply.

Soldiers interested in furthering their civilian education should also consider the "Bootstrap" program, where opportunities are more numerous than in the fully funded Enlisted Undergraduate Training Program. For example, there are still "Bootstrap" spaces for SY 73.

"Bootstrap" is for enlisted men and women who can complete their associate degree in six months or their bachelor's or advanced degree in eighteen months or less. A letter of acceptance from an accredited school indicating the period of time to complete the requirements for a degree is necessary. Preference is given to those who can complete their degree work in the shortest time and those whose area of study best matches the requirements of their career field or the Army's needs.

Potential applicants should read AR 621-1 (Training of Military Personnel at Civilian Institutions) and talk with their education advisor before applying. Questions which cannot be answered by these sources may be addressed to HQ DA, Chief, Education/Professional Development Division, ATTN: DAPC-EPC-E, Washington, DC 20310.

ARMOR/INFANTRY BRANCH'S NEW "CAREER HOME"

Headquarters, Department of the Army, recently announced in DA Circular 600-91, dated 12 Jan 73, the establishment of the Military Personnel Center (MILPERCEN). The establishment of MILPERCEN provides for consolidation of military personnel operational functions under one manager and will result in streamlined organization to serve the soldier and the Army.

The Enlisted Personnel Directorate (EPD) is the enlisted personnel operator for MILPERCEN. The Directorate's mission is to get qualified people to the right place at the right time in the right numbers. The directorate functions range from service entry and initial training, through distribution, evaluation, professional management, reclassification, and reenlistment.

The Assistant Director for Enlisted Career Management directs the Armywide assignment of all enlisted personnel and controls overall career management. He supervises the Combined Arms Division, which is one of five branch or specialty-oriented divisions.

The Combined Arms Division assigns and manages all enlisted personnel assigned to the Field Artillery, Air Defense Artillery, Infantry and Armor branches, and all soldiers performing as Drill Sergeants.

The ARM/INF Branch has overall responsibility for all Infantry and Armor enlisted personnel, and for management of the Drill Sergeant Program. The branch now has career management files on those Sergeants First Class and Specialists 7 (E7) through Sergeants Major (E9) that it manages. The branch is now gathering files on Infantrymen and Tanker Staff Sergeants and Specialists 6 (E6). Files for those in the rank of Sergeant and Specialist 5 (E5s) will be assembled at a later date.

The Infantry section has the responsibility for over 65,000 Infantry personnel. The Armor section manages over 20,000 Armor soldiers. Each section is further divided into teams of assignment managers dealing with specific Military Occupational Specialties (MOS). This is where each soldier is selected for assignment. The Drill Sergeant Team manages approximately 5,800 Drill Sergeants.

The Armor/Infantry Branch is now located in room 1C730 in the Pentagon, but will be moving to Hoffman Building I, Alexandria, Virginia in the near future.

The personnel assigned to the branch are dedicated to providing a "career home" for all Infantry, Armor and Drill Sergeant personnel. They will "tell it like it is"; and help insure that each soldier receives personal and equitable consideration of his assignment and professional development problems.

news notes

MG DESOBRY TO COMMAND V CORPS

Major General William R. Desobry, commander of the Armor Center and Fort Knox, will replace Lieutenant General Willard Pearson as commanding general of V Corps. He has also been nominated for promotion to Lieutenant General.

General Desobry received his commission in 1941 through the ROTC program at Georgetown University. After completing the Infantry Officer Basic Course, he served with the 29th Infantry Regiment and the 10th Armored Division in CONUS and the European Theater.

Major General William R. Desobry

While engaged in the defense of Bastogne, he was wounded and captured and spent a year as a prisoner of war.

In 1955, after completing a tour as a faculty member at the Command and General Staff College, he returned to Germany as commander of Combat Command C of the 2d Armored Division. He later served as division chief of staff and G3 of V Corps.

In 1965, General Desobry became Deputy Senior Advisor to the ARVN IV Corps in Vietnam, advancing to senior advisor the following year. After a two year tour with the Office of the Deputy Chief of Staff for Military Operations, he was appointed Commanding General of the 1st Armored Division at Fort Hood.

General Desobry has served as the Commandant of the Armor School and Commanding General of Fort Knox since 1971.

MG STARRY APPOINTED ARMOR CENTER COMMANDER

Major General Donn A. Starry will succeed Major General William R. Desobry as the Commanding General of the Armor Center and Fort Knox. General Starry is currently assigned as the Director of Manpower and Forces in the Office of the Assistant Chief of Staff for Force Development.

General Starry entered the Army as an enlisted man in 1943 and was commissioned from the US Military Academy in 1948. He is also a graduate of the Armed

Major General Donn A. Starry

Forces Staff College, the Army War College and holds a master's degree from George Washington University. General Starry has commanded tank units from platoon through battalion in 7th Army in Europe; and in 1969-70, he commanded the 11th Armored Cavalry Regiment in Vietnam. He led the regiment during the Cambodian incursion of May 1970.

VIETNAM ARMOR MONOGRAPH

A number of Armor Officers have recently received letters from Major General William R. Desobry, Commandant USAARMS, requesting that they review a narrative of events in which they participated while in Vietnam. These letters and narratives are the first efforts of a team of officers assigned the mission of preparing a comprehensive monograph on the role of Armor,

Armored Cavalry, Air Cavalry and Mechanized Infantry in Vietnam. While not pretending to be an official history, this publication will illustrate the lessons we learned, the development of tactics and techniques and tell the story of our branch in Vietnam.

If you have not been contacted and have firsthand knowledge of an event that seems to fit the objectives of the monograph, the project officers would like to hear from you. Of particular interest are the actions of Tet—1968 and the Cambodian incursion of 1970.

If you have any information or material such as reports, maps, or photographs you are willing to share, please contact:

Commandant
US Army Armor School
Attn. ATSAR-CD-DD (Monographs)
Fort Knox, Kentucky 40121

Any material provided will be returned if clearly marked with a return address.

LTC WAGNER AWARDED DISTINGUISHED SERVICE CROSS

Lieutenant Colonel Louis C. Wagner Jr. was presented the Distinguished Service Cross, Legion of Merit and Air Medal (1 OLC) by Lieutenant General William E. Dupuy at recent ceremonies at the Pentagon. Colonel Wagner received the DSC for his actions during the period 29 April 1972 to 2 May 1972 while serving as the Senior Advisor, 1st Armor Brigade, RVNAF. During this period, the 1st Armor Brigade was encircled by elements of three North Vietnamese Divisions in the vicinity of Quang Tri.

Colonel Wagner was cited for extraordinary heroism while advising and assisting his Vietnamese counterparts during attempts to stop the enemy drive to Quang Tri, and during the breakout from the enemy encirclement following the fall of Quang Tri. Colonel Wagner is currently assigned to the Office of the Assistant Vice Chief of Staff.

1ST SQUADRON, 6TH ACR HOSTS FORMAL "DINING-IN"

Approximately 80 officers and senior noncommissioned officers of the 1st Squadron, 6th Armored Cavalry Regiment recently held a formal "Dining-In" at the Ft. George G. Meade Officer's Club. The guest speaker for the occasion was the Secretary of the Army, the Honorable Robert F. Froehlke

CAVALRY GENERALS' FLAGS PRESENTED TO PATTON MUSEUM

The grandson of both the first and the last general officer Chiefs of Cavalry, Lieutenant Colonel Willard A. Holbrook, presented the flags of both generals to the Patton Museum during ceremonies held at the Fort Myer Officer's Club. Accepting the flag of Major General Willard Holbrook, first general officer Chief of Cavalry, is Colonel Paul S. Williams Jr, Chief of Armor Branch. This flag, along with the flag of Major General John K. Herr, the last general officer Chief of Cavalry, will be placed in the museum at Fort Knox.

BG NEWTON RECEIVES AWARD FOR DISTINGUISHED CIVILIAN SERVICE

Brigadier General Henry C. Newton, USAR-Retired, was recently awarded the Decoration for Distinguished Civilian Service by former CONARC Commander General Ralph E. Haines Jr. The award recognized General Newton's unique contributions as Educational Advisor to the CONARC Commander. While serving in this capacity, he conducted a thorough review of CONARC school operations which led to many improvements in the various Army schools.

PATTON EAGLE PRINT

The Cavalry-Armor Foundation is offering for sale in limited edition the George S. Patton Jr. Commemorative Eagle Print by wildlife artist Gene Gray. The print, which measures 22 by 27 inches, is a duplicate of the original painting now on display at the Patton Museum. There are 2,000 signed and numbered prints in the edition. All

proceeds from the sale of the print will go toward the further construction of the new Museum of Cavalry and Armor at Fort Knox.

The prints will be available on a first come, first served

basis, and will cost $50.00 each, plus $1.00 for handling and postage for each print. Payment should accompany orders and should be sent to the Cavalry-Armor Foundation, Box L, Fort Knox, Kentucky 40121.

ARMOR OFFICER NAMED TOP 1ST ARMY LIEUTENANT

First Lieutenant Thomas R. Keller, left, First Army's "Outstanding Lieutenant for 1972," receives his award from Lieutenant General Claire E. Hutchin Jr., First Army Commander. A 1970 graduate of the US Military Academy, Lieutenant Keller is the executive officer of D Troop, 1st Squadron, 6th Armored Cavalry Regiment at Fort George G. Meade.

CSM ORR RECEIVES AWARD FOR DESIGNING ACADEMY CREST

Major General William R. Desobry, commanding general of Fort Knox, presents an award to Command Sergeant Major Arnold E. Orr for his role in designing the distinctive insignia for the new Sergeants Major Academy. The award is a framed reproduction of the academy's crest, shield and motto along with an explanation of the motto's significance which reads: "Ultima" was selected as the motto of the United States Army Sergeants Major Academy to signify that the Academy is dedicated to preparing senior non-commissioned officers for the ultimate assignments throughout the Army. This motto was conceived by Command Sergeant Major Arnold E. Orr, United States Army Armor Center, Fort Knox, Kentucky.

the tarpaulin

Covers a bit of everything gleaned from the service press, information releases, etc. Contributions are earnestly sought.

TAKE COMMAND

MG Morgan Roseborough, Ft Devens . . . **COL William K. Geran,** Davison Army Airfield . . . **COL Peter J. Grasser,** 1st Bde, 2d Inf Div . . . **COL John P. Hodes,** 95th CA Gp, Ft Bragg . . . **COL Warren J. Lodge,** 7th Army Tng Ctr . . . **COL Robert H. Luck,** 5th Bde, USATCA . . . **COL Richard A. Miller,** 3d Bde, 1st Inf Div . . . **COL William C. Rousse,** 1st Bde, 1st Armd Div . . . **COL Robert Schweitzer,** 1st Bde, 3d Armd Div . . . **COL John W. Seigle,** 2d ACR . . . **COL Tommie G. Smith,** 2d Bde, 2d Armd Div . . . **COL Herman J. Vetort,** 3d Bde, USATCI, Ft Dix . . . **LTC Robert J. Bertrand,** 1st Army NCO Acad . . . **LTC James F. Cullen,** 2d Bn, 81st Armor, 1st Armd Div . . . **LTC David K. Doyle,** 3d ACR . . . **LTC John R. Fiske,** 2d Bn, 33d Armor, 3d Armd Div . . . **LTC Francis W. Hall Jr,** 3d Sqdn, 2d ACR . . . **LTC Edward V. Kelly,** 1st Bn, 32d Armor, 3d Armd Div . . . **LTC Gordon L. Stone,** 1st Recon Sqdn, 1st Bde, USATCA . . . **LTC Robert E. Wagner,** 1st Bn, 70th Armor, 4th Inf Div . . . **LTC Macon W. Wells,** 2d Bn, 68th Armor, 8th Inf Div . . . **CPT Robert E. Harry,** Trp B, 3d Sqdn, 12th Cav, 3d Armd Div . . . **CPT Ronald R. Post,** Hq Trp, 3d Sqdn, 12th Cav, 3d Armd Div . . . **CPT Charles H. Watts,** Trp A, 3d Sqdn, 12th Cav, 3d Armd Div.

ASSIGNED

MG James Hollingsworth, DCG, 5th Army . . . **MG William R. Kraft Jr,** CofS, USAREUR & 7th Army . . . **MG Joseph W. Pezirtz,** AMC . . . **BG Ronald J. Fairfield Jr,** OTIG . . . **BG Jack MacFarlane,** Alaskan Cmd . . . **BG John W. Vessey,** DCSOPS, DA . . . **COL Albert Ahrenholz,** Ft Gordon . . . **COL Walter G. Allen,** Computer Sys Cmd . . . **COL Warren P. Allen,** HQ TRADOC . . . **COL Forrest De Ballou,** OCINFO . . . **COL Raymond B. Battreall,** SOUTHCOM . . . **COL Raymond H. Beaty,**

JUSMAGTHAI . . . **COL Robert K. Bein,** Club Mgt Agcy, Presidio of SF . . . **COL Philip L. Bolte,** OSA . . . **COL Robert L. Bradley,** ROTC Rgn Hq, Ft Lewis . . . **COL Standish O. Brooks,** 1st Rctg Dist, Ft Meade . . . **COL Robert M. Carroll,** MDW . . . **COL Egbert B. Clark III,** HQ V Corps . . . **COL Arthur F. Cochran,** CofS, Allied Staff, Berlin . . . **COL James B. Colson Jr,** HQ FORSCOM . . . **COL Carlisle B. Cox Jr,** HQ III Corps . . . **COL Ellsworth Crowley,** JUSMAG Korea . . . **COL Charles E. Davis,** HQ FORSCOM . . . **COL Thomas B. DeRamus,** HQ FORSCOM . . . **COL Roy W. Farley,** USREDCOM . . . **COL Harold J. Fleck,** HQ TRADOC . . . **COL Charles P. Graham,** DCSOPS, DA . . . **COL Benjamin S. Hanson,** Club Mgt Agcy, European Rgn . . . **COL Sidney S. Hazard,** USAARMS . . . **COL Jess B. Hendricks,** S&F, CGSC . . . **COL Howard K. Hostler,** MASSTER . . . **COL Richard W. Hughes,** USAARMC . . . **COL Ernest F. Jacobs,** Ft Meade . . . **COL Richard V. Krogh,** SAA, West Va ARNG . . . **COL Carl B. Lind,** ROTC Rgn Hq, Ft Knox . . . **COL Robert E. Ley,** USAARMS . . . **COL Samuel R. Martin,** AFCENT . . . **COL Paul B. McDaniel,** HQ TRADOC . . . **COL Garland McSpadden,** UN Cmd, Korea . . . **COL Stephen E. Nichols,** SHAPE . . . **COL Alva Pendergras,** PMS, Univ of Tenn at Martin . . . **COL William R. Ponder,** Ft Rucker . . . **COL James B. Reed,** USAARMS . . . **COL Maurice D. Rice,** Ft Gordon . . . **COL James W. Rowe,** Club Mgt Agcy, Hawaii . . . **COL Albert Singletary,** DCSPER, DA . . . **COL Robert Stoverink,** MILPERCEN . . . **COL Gene A. Weaver,** PMS, Ariz St . . . **LTC John Ballantyne,** AVCofSA . . . **LTC Reid A. Barrett,** USAARMS . . . **LTC James A. Boehme,** Armor Engr Bd . . . **LTC Gordon Chapin,** MASSTER . . . **LTC George Coffert,** 1st Bde, 1st Cav Div . . . **LTC Conrad Hawkins,** CDEC . . . **LTC Andrew L. Cooley,** HQ FORSCOM . . . **LTC John H. Cooper,** CDEC . . . **LTC Sammy T. Cox,** HQ CONARC . . . **LTC Sterling Darling,** CENTAG . . . **LTC George E. Derrick,** USAARMS . . . **LTC William S. Graf,** OCINFO . . . **LTC Philip J. Haan,** MASSTER . . . **LTC David D. Horner,** ACSFOR, DA . . . **LTC James A. Howden,** CDEC . . . **LTC Ivan H. Howitz Jr,** OTIG . . . **LTC John W. Hudachek,** Con Anal Gp, Bethesda . . . **LTC Harlan A. Keith,** ROTC Rgn Hq, Ft Lewis . . . **LTC Thomas W. Kelly,** ACSFOR, DA . . . **LTC Joseph A. Langer,** OCofSA . . . **LTC James E. Madole,** CDEC . . . **LTC James D. Marett,** HQ CONARC . . . **LTC William J. Moran,** USAARMS . . . **LTC William Muenter,** ROTC Rgn Hq, Ft Bragg . . . **LTC Dave R. Palmer,** OCofSA . . . **LTC Nathan M. Pulliam,** 2d Bde, 1st Cav Div . . . **LTC Carl M. Putnam,** HQ FORSCOM . . . **LTC Fred B. Raines,** DCSOPS, DA . . . **LTC Robert J. Sunell,** USAARMS . . . **LTC James M. Van Hook,** HQ CONARC . . . **LTC Jerry S. Wages,** SHAPE, ALFSEE . . . **LTC John H. Weckerling,** 1st Bde, 3d Armd Div . . . **LTC Robert N. White,** HQ CONARC . . . **LTC John Woodmansee,** HQ CONARC . . . **MAJ Gary W. Bloedorn,** AFSOUTH . . . **MAJ Nelson J. Cooper,** USAAVNS . . . **MAJ Donald A. Desapri,** HQ CONARC . . . **MAJ Randall L. Ford,** S&F, USAIS . . . **MAJ Kent E. Harrison,** OSA . . . **MAJ Leigh D. Haselgrove,** USAARMS . . . **MAJ Herbert C. Hertel,** MASSTER . . . **MAJ William V. Hill,** MILPERCEN . . . **MAJ Larry L. Hjorth,** MASSTER . . . **MAJ Joseph Kulmayer,** MILPERCEN . . . **MAJ David Larcomb,** HQ 6th Army . . . **MAJ Kermit J. Larson,** 155th Atk Hel Co . . . **MAJ William G. Lutz,** MASSTER . . . **MAJ Francis B. Martin,** ACSFOR, DA . . . **MAJ Patrick Quinlan,** OJCS . . . **MAJ James M. Riley,** Readiness Rgn 1, Ft Devens . . . **MAJ Will Rittenhouse,** MASSTER . . . **MAJ Michael D. Shaler,** HQ 3d Army . . . **MAJ Glen J. Thorson,** MASSTER . . . **MAJ Harold H. Wilkins,** HQ FORSCOM . . . **MAJ Carl W. Yates,** 3d ACR.

VICTORIOUS

GEN Bruce C. Clarke has been selected to receive the Chief of Engineers Award for Outstanding Public Service . . . **MG Delk M. Oden** has been elected the 10th National President of the Army Aviation Assn of America . . . **LTC Newell E. Vinson** has been selected for a fellowship at the Industrial College of the Armed Forces . . . **MAJ John L. Kendall** will attend the Canadian Forces Staff College at Kingston . . . **CPT Montgomery C. Meigs** is attending the Royal Armour School at Bovington Camp . . . The highest score ever fired on range 80 at Grafenwoehr by an American crew was recorded by tank A55, 3d Bn, 64th Armor, 3d Inf Div. The crew of **1LT Mike Lawler, SP5 Howard Anderson, PFC Charles Clark** and **PVT Phil Budd** fired a total of 2540 points out of a possible 2920 for the day and night runs . . . **1LT Fred L. Montgomery** is Lieutenant of the Year at Ft Knox . . . **MAJ James H. Burns,** of the Mississippi ARNG Aviation Support Facility, has received the Army Aviation Broken Wing award for his skill in handling a severe emergency without injury or damage to his helicopter . . . **MRS Harriet McCormic,** wife of CPT Frank T. McCormic, company commander of A Co, 1st Bn, 35th Armor, has been named 1st Armd Div Military Wife of the Year . . . Distinguished Graduate of AOB 73-5 was **2LT Bernard J. Redlinger;** Honor Graduates were: **CPT Christopher S. Kilgore, 2LT Robert M. Salter, 2LT Bruce B. Edmiston** and **2LT Wayne A. Weigand** . . . Distinguished Graduate of AOB 73-6 was **2LT James M. Slone;** Honor Graduates were: **2LT Michael P. Reger, 2LT Brian Dillon, 2LT Michael F. Broe** and **2LT John E. Heinze** . . . Distinguished Graduate of AOB 73-7 was **2LT William Gordon McConnell;** Honor Graduates were: **1LT Dan E. Hasenfratz, 2LT Everett T. Coyle Jr,** USMC, **2LT Lawrence E. Vaupel** and **1LT Robert A. Harms** . . . Distinguished Graduate of Motor Officer Class 73-7 was **2LT Edward F. Merkle;** Honor Graduates were: **2LT Robert A Nalewajek, 1LT Leo E. Keenan III** and **2LT Michael E. Moore** . . . Distinguished Graduate of Motor Officer 73-8 was **2LT James R. Pratt III;** Honor Graduates were: **2LT John J. Evans, 2LT Donal F. Ching** and **2LT Robert D. Reuter** . . . Distinguished Graduate of Motor Officer Class 73-9 was **2LT William D. Hardy;** Honor Graduates were: **2LT John E. Baker, 2LT Mickey T. White** and **1LT Richard D. McCreight** . . . **SP5 Stephen Snyder,** B Trp, 1st Sqdn, 9th Cav, 1st Cav Div has been selected Ft Hood Senior Enlisted Soldier of the Year . . . **SFC Bernard Henke** of the 70th Armor, 4th Inf Div has been named Senior Enlisted Soldier of the Year at Ft Carson.

AND SO FORTH

MAJ Colin P. Kelly III, a former Armor officer, is now attending the basic course of the Army Chaplain School . . . **Trp D, 3d Sqdn, 4th Cav, 25th Inf Div** has been awarded the Presidential Unit Citation for action on 26 Apr 69 . . . All officers of the **3d Bn, 102d Armor, New Jersey National Guard** are members of the Armor Association . . . **LTC Samuel E. Fleming,** 2d Bn, 198th Armor, Mississippi ARNG has the first National Guard unit to qualify for the Armor Association Award . . . Five of the first fifteen men in this year's class at USMA went Armor including numbers 3, 4 and 5 . . . **GEN Barksdale Hamlett** has been elected president of the Retired Officers Assn . . . **CSM Thomas J. Carruthers** is the new CSM of the 2d Armd Div replacing CSM Dwight M. James who has retired . . . **PFC Linda Lee Nommensen,** a clerk in the G4 section, is the first WAC to be assigned to the 1st Armd Div . . . Former Army warrant officer helicopter pilots are eligible for the Marine platoon leaders class (aviation)/aviation officer candidate programs . . . The California State Assembly has passed the **POW Homecoming Act** of 1973 . . . The **25th Inf Div Assn** will hold their 24th reunion in Richmond, Va 27-29 Jul . . . The Correctional Training Facility at Ft Riley has been redesignated the USA Retraining Brigade . . . Cutoff date for award of the **Vietnam Service Medal** is 28 Mar 73 . . . Bonds of Friendship are in the process of being established between the following Australian and US Cavalry units: The US 2d ACR and 2 Cavalry Regiment, Holsworth, NSW; US 3d Sqdn, 4th Cav and A Squadron, 4 Cavalry Regiment, Enoggera, Queensland; US 11th ACR and B Squadron, 3 Cavalry Regiment, Townsville, Queensland.

ARMOR SELECTIONS FOR LIEUTENANT COLONEL-AUS

*Secondary Zone #Armor Aviator

*Allen, Lee	1214	#*Luck, Gary E	1186	Quinlan, Patrick J	0823
Alley, Frank M Jr	0968	*Maddox, David M	1249	#Rackley, Robert L	0754
Andre, David H	0363	Markl, Charles W	0028	Root, Duane B	0263
Appel, Cyril W	0138	#Martin, Donald R	0194	Russell, Tom S	0928
Atwood, John B	0344	#Martin, Thomas L	0952	Ryburn, Glenn O Jr	0411
Bacon, Stanley Jr	0153	Matthews, John P	0496	Starley, Vernon B	0810
*Behrenhausen, Richard	1280	#Maxson, Ronald G	0274	Stofft, William A	1025
#Bradin, James W IV	0223	McGaw, Charles D	0575	*Streeter, William F	1139
#Brasuell, Perry T	0551	McVey, Peter M	0470	*Sullivan, Gordon R	1166
Bratisax, Roland J	0666	Monihan, Joseph R	0664	Swain, Richard C	0946
Carbone, Anthony J	0494	Morris, Dannie Barn	0506	Talbot, Ralph IV	0461
Carter, Bobby J	0797	Norris, Jimmy R	0793	#Turner, Rex M Jr	0862
#Chavis, Langley J	0204	Nowak, Leonard G	0800	Wasson, James V	0755
*Clark, Claude L	1203	#O'Neill, Joseph J	0130	Wilhite, James A	0229
#*Clark, Jack T	1153	#Ostermeier, William	0308	Williams, David H	1072
#Clark, Shannon D	0681				
Clough, William S	0252				
Corliss, William D	0857				
Cortelli, Richard J	0871				
Dembinski, Mark L	0234				
*Dice, Jack W	1205				
Fogelquist, Kenneth	0667				
#Fournier, Albert L	0596				
Francis, Joseph T	0306				
#Frost, Robert W	0305				
#Funk, David L	0595				
Good, William K Jr	0839				
Hamby, Jerrell E	0848				
#Ivey, Charles E	0865				
Jordan, Josef C Jr	0985				
#Kaler, William R	0876				
Kelso, Robert E	0550				
#Kulmayer, Joseph L	0920				
Lang, John A	0535				
*Leland, Edwin S Jr	1279				
#Lozano, William	0993				

ARMOR BOX SCORE

OVERALL

	CONSIDERED	SELECTED	% SELECTED	SECONDARY ZONE SELECTED
Armor	104	57	54.8	10
Army	1,627	868	53.4	151

FIRST TIME CONSIDERED

	TOTAL	SELECTED	% SELECTED
Armor	69	53	76.8
Army	1,152	798	69.3

ARMOR AVIATORS

	CONSIDERED	SELECTED	% SELECTED	SECONDARY ZONE SELECTED
Overall	23	18	78.3	2
First Time	22	17	77.3	—

from the bookshelf

AUGUST 1914
by Alexander Solzhenitsyn. Farrar, Straus and Giroux. 622 pages. 1972. $10.00.

This best selling novel has been extensively and lavishly praised by many of the most widely read publications of the country. It has been compared to Tolstoy's *War and Peace*, praised as the Nobel prize winning Solzhenitsyn's best novel and bought by book readers worldwide.

I agree with the critics. This is a great novel, a fictional epic based on the historical facts connected with the Russian defeat at Tannenberg at the beginning of World War I. I read *War and Peace* some years ago and was quickly struck by the similarities in style and substance with *August 1914*. Both novels deal with Russia at war, with myriad quickly focused characters, with sociological philosophy, with perceptive descriptions of scene and event and with a turning point in history.

But what is its pertinence for *ARMOR* readers? Its pertinence is in its recounting of a battle, its critique of the Russian command and its insights of men at war. In my opinion, Solzhenitsyn surpasses Tolstoy in his understanding and description of war.

Solzhenitsyn is a celebrated and successful author. The New York Review of Books calls him "the most gifted of Russian writers." He served in the Russian Army for four years during World War II and has obviously thoroughly researched his subject. He says he has long contemplated writing this work. This is a man who should write masterfully of war.

He uses his artistry to make the events of a battle coherent and interesting—even for the general public. The bulk of the book is a series of descriptions of events and their human impact on the various segments of the Russian forces during the decisive battles in what is now Poland and eastern Germany during mid-August 1914. I have not before encountered an author who has done this so readably.

The battle of Tannenberg during the first few weeks of World War I saw the Russian Second Army under General Samsonov encircled and destroyed by the Germans under von Hindenberg. It is often called the modern Cannae. Solzhenitsyn apparently views this battle as the jugular cutting of Tzarist rule and thus of major historical importance. The Communist dictatorship eventually followed.

The Russian forces pushed forward precipitously and with inadequate preparation into Germany. The Germans pulled back as the Russians outran their supplies, became disorganized, lost contact and lost control. The Germans then penetrated through the gaps of the Russian lines, surrounded the entire Second Russian Army and destroyed it. Some 125,000 Russians were captured; their total casualties are unknown.

Russian command failings are clearly portrayed. They were unprepared, mentally, psychologically or technically to command large forces on large fronts. General Samsonov is sympathetically portrayed but he is obviously inept. Other Russian leaders are not only inept but ill-intentioned. They are portrayed as vain and self-seeking, often cowardly. They cannot communicate, are lazy, so ill prepared that they don't even have maps. If the picture is true, and other authors support these views, the atrophy of Tzarist Russia is pathetically revealed.

On the other hand, the stolid courage of the Russian peasant pervades the book. This is Tolstoyan and consistent with the current Russian self-image.

I fault *August 1914* on individual characterizations. They are too simplistic. The general patterns described above may have some validity, but men in battle are more complex and have more variations than the author describes. He is unrealistically cynical about the officer corps and idealistic about the Russian peasants. Real soldiers are not that way in war.

August 1914's real triumph—and this is precedent establishing in my reading experience—is the coherence with which the elements of the battle are put into a whole. The author devotes chapters to various corps and divisions. He realistically and vividly portrays what must have taken place without losing the trend of the overall conflict or the reader's interest. This is most difficult to do and the absence of maps further complicates it. There is an intense feeling for the obstacles that terrain and weather present to commanders and to individual soldiers. The haze of battle is real. The confusing picture due to lack of communications must be precisely the way it was.

In sum, I recommend this book for those interested in better understanding war. Battle description is vivid; strategic, command and communication and control failures are instructive. Characterization faults can be discounted and will be by those who know men in war. It is pleasant reading.

Brigadier General John F. Forrest
Director of Officer Personnel

SOLDIER
by Lieutenant Colonel Anthony B. Herbert (USA-Retired) with James T. Wooten. Holt, Rinehart & Winston. 485 pages. 1972. $10.95.

Anthony Herbert's book, *Soldier*, purports to be a factual biography; the story of how he joined the Army, fought for it in two wars and in peace, and finally came to grief at its hands. By now, Herbert's side of the story is quite familiar. After a brilliant career (by his own admission), he has alleged that he was relieved of battalion command in the 173d Airborne Brigade in Vietnam because he reported war crimes to two superiors, Colonel Ross Franklin and Major General John Barnes. This allegation is at once the apparent focal point and the rationale for the book.

Herbert's story seeks to picture a career in the Army in which Herbert was always right, standing constantly in confrontation with a corrupt, or inept, or stupid Army. The book, however, offers an unsatisfying and incomplete fragment of the real story, particularly as it relates to the Vietnam events Herbert writes about. Recently that story has begun to come to light outside the covers of Herbert's book.

As the whole truth unfolds, revealed by various sources—CBS's Mike Wallace and Barry Lando and many others—one can now only regard his story with the most serious suspicion. Anyone interested in objective examination of the story certainly ought to review the following sources: US Army Command Information *Spotlight's* Issue 21, "LTC Anthony Herbert Fact Sheet," dated 12 November 1971, available at Army posts worldwide; the 27 February 1973 *Congressional*

Record, pages S3493-S3503, carrying Senator Barry Goldwater's skeptical comments on Herbert's credibility, together with the transcript of the 4 February CBS "60 Minutes" TV show which virtually demolished Herbert's credibility; and the 22 February 1973 *Congressional Record*, pages S3160-S3161, which carries both Senator Strom Thurmond's comments on the "Herbert hoax," and reprinted articles on the affair from *Time*, the *New York Times* and *Arizona Republic*, the western newspaper which reported Herbert as "motivated by ego, ambition and a need for revenge" as early as 6 October 1971. Another readily available source is the excellent 21 February *Army Times* book review (reprinted in the 27 February 1973 *Congressional Record*, pages S3504-S3505) by L. G. Smith, which also focused on *Soldier* episodes and events in the point-by-point examination of fact researched by CBS's "60 Minutes." And recently, S. L. A. Marshall, in an article in the *Philadelphia Inquirer* (25 February 1973), notes that even Herbert's accounts of personal heroism and derring-do from the Korean War do not hold much water; events and times Herbert records, Marshall points out, do not square with historical fact.

There is not room in this review to consider Herbert's claims, point-by-point. However, by examining the sources mentioned above, the serious reader will find it abundantly clear that Herbert's story of his relief and of the war crimes cover-up he alleges against Franklin and Barnes amounts to a hoax.

We know that hoax is an old genre, if fraud (as Webster has it) can be so dignified. But it is one which remains a shadow genre because of its tainted reputation. It demands special justification to compensate for its deliberate license with the truth—say to entertain, or point out social injustice. *Soldier* appears to serve no such purpose; rather it appears designed for some dark personal motive. Whatever it is, Herbert has done incalculable harm to the Army and a number of innocent individuals. The Army has not denied that some of the war crimes allegations he made had substance. They were investigated and followed up, once discovered.

But Herbert did not report them in Vietnam, was not relieved for reporting them, nor were any such reports of war crimes covered up by General Barnes or Colonel Franklin. Although he claims he was relieved from command because he reported war crimes to his superiors, there is no testimony whatever to this effect in the hearing called at his request for redress of relief. Herbert's story, that he did not mention war crimes allegations at this hearing because he was told it was not the proper place to do so, is simply not believable. It defies imagination that the outspoken Herbert would fail to mention the alleged central cause of his relief at a hearing he himself asked for to redress that relief. A further significant fact is that Herbert never charged any of the alleged perpetrators of war crimes with anything whatever, but sought out for attention the two men who had, in effect, ended his career because he was, in their eyes, untrustworthy and untruthful. These are the key issues, and Herbert's perspective of them in *Soldier* is entirely distorted.

There will be some who decry any attack on Herbert's credibility, but credibility is what this story is all about. Since the book heralds one event after another which boil down to Herbert's word only, or his word against another's, Herbert's credibility is essential to any comment on the book. Maurey Povich of Washington's Channel 5 TV made this point to Herbert, remarking that Herbert's truthfulness is all that the book has to stand on. And now that the dust has settled, it appears to this reviewer that Herbert's credibility is in very serious doubt, if not lacking altogether.

Well, then why has the book gained any credence whatever? The anti-intellectual temper of our times seems to compel many of us to accept the most outrageous things uncritically. We are impatient of any troublesome search for truth, and are all too willing to settle for anything which either reinforces our biases or sounds plausible merely on the face of it. In this instance, the acceptance of Anthony Herbert is part of this phenomenon, in which the uncritical or uninformed reader draws from the fact of My Lai, invalid, illogical inferences about the Army and its real soldiers.

Finally, it seems to me that the central fact of the whole Herbert affair has been missed entirely. He emerges strongly suspect of the most monstrous crime of all, that is, the use of a knowledge of war crimes for opportunistic personal ends. That idea, again and again, comes to the forefront as more and more evidence emerges to show that Herbert in no way, at any time, reported war crimes to his superiors, nor to anyone else in authority until 18 months after he left Vietnam, after his career had been finally ended by denials of his efficiency report appeal and after the My Lai affair hit the press. Rather, he kept such knowledge concealed until it suited his purpose to reveal it. This conduct shows not concern for war crimes and their victims, but the most heinous misuse of such knowledge. Would any decent man, any real soldier, commit such a moral outrage?

Holt, Rinehart and Winston have published not a *Herbert Agonistes*, but a latter-day chapter in the life of the American Army's Baron Munchausen.

Lieutenant Colonel John T. Murchison Jr.

THE BEST AND THE BRIGHTEST by David Halberstam. Random House. 688 pages. 1972. $10.00.

David Halberstam has written one of the most important books about the genesis of American involvement in Vietnam and may well earn another Pulitzer Prize. In reading this work, one might first look at the epilogue so as to set the tone and establish the perspective from which Halberstam wrote the book. It is important to understand Halberstam's personal philosophy and his political persuasions, and accept that his personal heroes are people like Eleanor Roosevelt, Averell Harriman and Chester Bowles.

The book seems to be in two parts, broadly separated at about the time marked by the large United States troop commitment to South Vietnam. The separation is primarily in terms of Halberstam's style of writing. The latter part of the book reflects the superb journalism that one has learned to expect from him over the years. The earlier part is more reminiscent of the shrill that we became used to as the usual fare, representative of antiwar ultra-liberal journalism and which doesn't do Halberstam justice.

Throughout the earlier part of the book, Halberstam would have you believe that there was ongoing in Washington in the mid-60s, two Machiavellian conspiracies. On the civilian side, our senior political leadership was being steered by a group of strategists who manipulated the comings and goings of government purely for power's sake, at the submergence of the national interest. In the military, the same kind of sinister cabal existed, made up of generals and admirals who calculated to bring about a bigger war purely to justify larger defense budgets and enhance self-interests. The conspiratorial nature of this particular part of his book is overdone, if he is trying to prove that manipulation can occur. He fails to prove that there were sinister purposes behind the maneuver-

ings and history will probably show that such conspiracies never existed.

His character portrayals of the most important of the players during that era are revealing, tough and what must be described as surgical. He does not hesitate to call Robert McNamara a fool and he treats Walt Rostow, McGeorge Bundy and Maxwell Taylor as imperceptive and insensitive. His severest treatment is reserved for Lyndon Jonson who he describes as a crude, devious super-egotist concerned only with his contemporary image and his place in history.

Mr. Halberstam judges many of the key actions and decisions made during the formative years of America's involvement in Vietnam in a relative vacuum. When it is convenient for him, he chooses frequently to ignore pressures existing at the time decisions were made and actions taken. He judges 1964 actions as they affected China from the present Nixon-visit-to-China perspective and forgets that the American view of containment, while less attractive today, had been tempered in those years by the Russian intervention in Czechoslovakia and Chinese development of nuclear weapons. When convenient, however, he does consider decisions made in relation to other conditions. He continually uses the protection of the Great Society programs as Lyndon Johnson's rationale for the piecemeal commitment of the United States to Vietnam.

Throughout the book we find Halberstam's irritating technique of reporting the substance of two- and three-way conversations as if he had been personally present, even when it is clear that he could not have been. He reports details as if they were unimpeachable, when it's clear that he was dependent for his information upon participants who have a stake in the outcome of the reporting.

Even his heroes do not escape this treatment. In one case, Averell Harriman is described as a spoiled and pompous man subordinating at times his nation's best interest to his own gigantic ego.

The most important part of the book, making it required reading for all military officers is the thread carried through the work regarding accuracy in military reporting. He convincingly demonstrates that our national leadership, to include those in Saigon, was making significant decisions based on faulty information supplied by the military. Our (the military's) penchant for "progress reporting" (where progress is implied and the lack of it is distasteful), and the practice of holding the advisor responsible for the success or failure of the advised are major shortcomings of the United States military in the Indochina experience. It demonstrates a significant breakdown in our staff system which did not provide for sufficient objective analysis to effect a translation between the "can do" attitude so necessary at the grass-roots advisory level and the decision-makers, insuring that decisions are made from the basis of fact and not from wishful thinking. The demands of the McNamara machine which insisted upon quantitative and qualitative data for every factor and feature of the advisory and combat effort, bringing about such aberrations as the body count, do not provide an excuse for the breakdown in the military reporting system.

Returning again to the epilogue, Halberstam apologizes for not trying harder as a reporter to influence the United States efforts in South Vietnam and head off the American involvement. He need not apologize considering his political persuasions. Mr. Halberstam's pessimism and forecasts of American failure are based on his earlier (1963-65) and also superb writings giving him a somewhat vested interest in proving his predictions correct. None of this takes away from the superb journalism and outstanding writing in making this one of the most important works to come out of the war. Taken from the perspective of the January 1973 cease-fire in realizing that South Vietnam will probably survive and will owe its survival to the efforts of United States arms, long historical inquiry is required to explain the war, but most certainly this inquiry will not treat Vietnam in isolation. History will view the war as one in a series of actions taken by free men to prevent the spread of an ideology alien to them. If history determines that preventing the spread of communism was moral and in the best interests of free men, then United States policy and the war in Vietnam will be recorded as an honorable effort executed by honorable men with honorable intentions.

Lieutenant Colonel T. G. Westerman
OCSA

THE WAR OF 1812
by John K. Mahon. University of Florida Press. 449 pages. 1972. $12.50.

The War of 1812 is probably the war most neglected by students of American Military History. While there have been some studies of the causes of the war published in recent years, there has not been an operational history written since that prepared about 90 years ago by Henry Adams as part of a larger work. Professor Mahon has delved even more deeply into the records; in addition to the American archives, he searched the records of both the British and Canadians which were not available to Adams.

Mahon's credentials are excellent. He is a recognized authority on the militia of the early years of the Republic. While serving in the Office of the Chief of Military History of the Army he compiled the initial Infantry Volume (through World War II) of the Army Lineage Series. He has numerous articles and books to his credit and is presently chairman of the Department of History at the University of Florida.

Discounting the War of Independence, this was the young nation's first war; the first fought by a government established by the Constitution and it was a severe test of that organization. In the events leading up to the war there were regional differences of viewpoint based more upon economic and political self-interest than anything else. Internal party differences were known even then. To quote the author, "Few Americans attempted to estimate the ability of the United States to wage war. None of them doubted that the inherent strength was available, but many, such as John Randolph, questioned the ability of the government to channel that power. Randolph jeered at his own party's jingoism; he said it was supported by insufficient money, arms, and navy and had only courage enough to pass resolutions. Randolph and other skeptics knew that there was too much factionalism, sectionalism, and individualism at large in the nation."

Once we were in the war, many of the states failed to mobilize their militia when directed by the government, declaring the Federal demands were unconstitutional. Support of the war varied from a reluctant minimum by Massachusetts to a comparative all-out effort on the part of Kentucky. The reasons were varied. Massachusetts preferred her trade with Britain to support of the principle of resistance to impressment and did, indeed, give economic support to the British forces in Canada throughout the war. Georgia and Tennessee were pleased with the opportunity to suppress the Creeks and to shoulder the Spanish out of Florida. Kentucky's main concern was elimination of the Indian threat and many in New York wished to invade Canada. However, New York's militia, in common with those of

most of the states, stood on their constitutional rights and refused to fight outside the territorial limits of the United States. Repeatedly, plans of commanders could not be carried out or came to a disastrous end at mid-point because of the intransigence of the militia.

But other factors were equally significant in making this an example of how not to conduct a war. There was no organization at the seat of government either to plan strategy or to supervise the conduct of the war. There was no overall commander to coordinate the operations either on land or at sea. The Secretary of War who acted for the President in command of land operations never accepted the responsibility of authoritative direction of associated campaigns. Politics influenced the designation of commanders and personal animosities or ambitions prevented generals from supporting each other or the Navy on the Great Lakes from cooperating fully with the land commanders. Financing of the war was haphazard and procurement was equally bad. Even a reorganization of the War Department in May 1812 to provide a semblance of a general staff was too little, too late. It was primarily an attempt to achieve more efficient military housekeeping and continued the neglect of strategic planning and command direction.

Professor Mahon has put together a detailed operational narrative that is easily read. For perhaps the first time equal emphasis is given to both the land and naval operations in a single volume; many campaigns are covered in considerable detail without sacrificing reader interest. The organization of material is unusual but effective: a prologue followed by a treatment of the war by years, subdivided by geographical areas or campaigns. Either the scholar or the casual student of history will find this organization lends itself to readily locating data concerning specific participants, places or events. All in all, it is an excellent book and one the serious student of the military profession should read to further his understanding of the limitations historically placed upon him by our American Heritage.

Brigadier General Hal C. Pattison
USA-Retired

DEAR MISS EM: General Eichelberger's War in the Pacific, 1942-1945

Edited by Jay Luvaas. Greenwood Press. 309 pages. 1972. $12.50.

Dear Miss Em is a collection of heavily edited letters drawn from those written by General Robert L. Eichelberger to his wife during his World War II years in the Pacific theater of operations. As such, it certainly represents a valuable, if somewhat flawed piece in the mosaic of the total picture of that area and period of our military history. Probably the book's most interesting offering is its exposure of the play and clash of the key military personalities involved in the Pacific operations. We are able to follow them from a time when they were not publicly well-known to a period when their exploits had made several world-famous. The author's descriptions give a fascinating insight into their personal and official development as their roles unfold.

Eichelberger himself comes through to the reader as a brave, forthright and sensitive man, jealous of the prestige of his men and particularly of his own prestige. He was intensely loyal to the men under him and consequently reacted with acute disappointment and even bitterness when he detected what he considered disloyalty from his commanders, and some contemporaries, to himself. Occasionally, he seems to miss the big picture of the war in which he was involved and to make somewhat unfair judgments of others in his preoccupation with his personal situation.

Interesting to note is the close attention Eichelberger paid to the fates and fortunes of his colleague across the world, General George S. Patton Jr. He indicates early that General Patton's troubles with the press would probably keep him from getting ahead professionally, a view he claims to share with General MacArthur. Later in the book, however, the editor notes in an excerpt from Eichelberger's personal diary that MacArthur "said he wanted me to become a Stonewall Jackson or a Patton and lead many small landing forces in from South . . ." and there is the feeling that Eichelberger considered Patton a counterpart to be monitored.

This book will be of considerable interest to military historians for its descriptions of individuals, such as MacArthur, Krueger and Sutherland, many of whom have not been described in the light the author employs. The book will certainly have special appeal for those who served in the Pacific at that time. However, one wonders if the publication of such personal letters has not done a disservice to the person of General Eichelberger, as they seem to emphasize a side of him that is not flattering and somewhat belittles his genuine achievements. One is inclined to fault the editor for this slant. In contrast to the editors of the earlier *Rommel Papers* and the recent *Patton Papers*, Jay Luvaas has, as he admits in his introduction, exercised free rein in restructuring the letters to his own editorial purposes. The sin of over-editing and occasionally of taking letters out of context therefore makes the book less valuable than it deserves to be, especially to serious students of military history.

Ruth Ellen Patton Totten

Mrs. Totten, widow of Major General James W. Totten and daughter of the late General George S. Patton Jr., is the author of The Rolling Kitchen *and a frequent lecturer to college audiences and military wives groups on subjects ranging from military heritage to witchcraft.*

TANK DATA 3

by Harold E. Johnson. WE Incorporated. 208 pages. 1972. $10.00.

This is the third in a series of volumes, written by various authors, describing the overall evolution of armored and tracked vehicles. There is no indication in the book of how much expertise or familiarity the author has with the subject matter.

This volume can be a valuable reference for a military history student or design engineer interested in the evolution of armored warfare. There is little narrative, so the reader must study the data and draw appropriate conclusions. For the most part, a full page black and white photograph is accompanied by a description of the vehicle on the adjoining page.

A little over half the book deals with 21 tanks, 21 self-propelled artillery pieces and 17 miscellaneous armored vehicles. British, Canadian, Soviet, Italian and Swiss vehicles are included; however, French and German tanks, along with US self-propelled artillery monopolize most of the pages.

A section of the book entitled "Tanks in Cross Section" restricts its coverage to Russian tanks. It loses much of its appeal because the descriptions have not been translated from Russian.

The pictures and data would have been more interesting had the book been organized in a more evolutionary sequence. For example, the German tanks in the first half of the book should follow the section "Early German Armor." Both would precede the very interesting sections "Captured Tanks Used by the German Army" and "Axis Armor." The most complete descriptions in the book are contained in the final portion entitled "Tank Armament."

Unfortunately the armament discussed has been obsolete for a number of years.

Overall the book is interesting but hardly worth the money to the average reader. It would however be a valuable addition to a reference library.

Lieutenant Colonel Carl M. Putnam
Army War College

GREAT COURT-MARTIAL CASES

by Joseph DiMona. Grosset & Dunlap. 291 pages. 1972. $6.95.

Mutiny, massacre and murder have, in the recent years of the Vietnam war and racial crisis, brought the system of military justice into the public's eye. History does repeat itself, however, and front-page courts-martial are not a new phenomenon. With the publication of *Great Court-Martial Cases*, we are reminded that public interest in military justice is not new.

Author DiMona has selected the most famous court-martial cases from the almost two-hundred year history of the US Armed Forces. Each case was of public interest at the time and each contributed toward or detracted from the overall quality of the military justice system. The author not only presents a summary of the situation surrounding each case and the case itself, but then points out the significance of each in its effect on the tradition and history of military justice.

The book is written for laymen rather than lawyers. The author unfolds each case in a dramatic and fascinating way, so that even in those cases where the verdict is known by the reader, there is no lack of suspense. From the court-martial of General Benedict Arnold through that of Lieutenant William Calley, *Great Court-Martial Cases* is good reading. The court-martial of the Captain of the *Chesapeake*, an 1807 version of the *Pueblo* case; the trial of General Custer for a series of charges ranging from absenting himself from his command without authority to having three of his men shot down as deserters and then refusing them medical attention; the General Mitchell court-martial: these and others provide an historic backdrop to the modern cases such as that of Sergeant McKeon and the drowning tragedy at Parris Island, and that of Dr. Levy and his refusal to train Special Forces medics.

Great Court-Martial Cases is both an interesting and educational book, well worth reading.

Colonel Philip L. Bolte
Army War College

ARMORED FIGHTING VEHICLES IN PROFILE

Edited by Duncan Crow. Doubleday & Co. Inc. 1972.
Volume 1: *AFVs in World War I.* 164 pages. $16.95.
Volume 2: *British AFVs 1919/1940.* 176 pages. $16.95.
Volume 3: *British & Commonwealth AFVs 1940-1946.* 315 pages. $16.95.

Profile Publications Ltd. in England has established a fully deserved worldwide reputation for producing outstanding books and pamphlets about armored fighting vehicles, aircraft, classic cars, and so forth. Now made available in the United States by Doubleday & Co., the three volumes under review will add luster to the Profile escutcheon.

The names of the chapter authors rolled together make for a roster of leading armor historians of the day—Duncan, Ellis, Chamberlain, Touzin, Gurtner, Bingham, Icks, White and editor Crow himself. The facts amassed and carefully presented in spare but interesting prose are amazing. The many photographs, surely there is hardly a page without one or more, make clear what these heroic armored vehicles were really like. The only thing lacking is sound—and smell. But, even here, the descriptions are such that one's imagination is stimulated to produce these. There are some great original paintings, many of which feature such details as uniforms and unit insignia.

Unexpected nuggets of history abound amongst the descriptions of hardware. Most notable in this respect are the chapters on British and Commonwealth armor units of World War II. They are all there and well-chronicled too. One hopes that later volumes in the series will do the same thing for US armored units of World War II and perhaps Korea and Vietnam as well. Our only regret thus far in the series is that the price of these scholarly and entertaining reference works must be so high.

Colonel O. W. Martin Jr.
Editor, Military Review

THIS COUNTRY WAS OURS: A Documentary History of the American Indian

by Virgil Vogel. Harper & Row. 473 pages. 1972. $12.95.

This is an arresting work. Although it is a documentary, it has the drama of historical fiction along with the essence of historical fact. From a mass of source material—treaties, memoirs, letters, speeches, notes, books, journals, newspapers—Vogel has extracted the thread of the red experience to construct a documentary ladder extending from pre-Columbian times to the present. From Aztec to Apache, Inca to Iowa, Maya to Modoc, the fabric is here, skillfully stitched together in a pattern of introduction, annotation, quotation, that confirms what the whites have done unjustly to the Indian.

This Country Was Ours will probably not be bought or read by the average reader (although it should be), nor will it reverse the course of history. But it may be used with profit by those—red or white, private citizen or government official—seeking to chart a future course, to make our actions match our ideals and make amends for what transpired in the past. It comes at a fitting moment, as the Nation approaches its bicentennial, and when expanded social consciousness, legal action and militancy are combining to promote long-delayed change.

The book contains several interesting and complementary appendixes listing significant dates, events and campaigns in Indian history, famous Americans of Indian descent from Hiawatha to Buffy Sainte-Marie, agencies concerned with the American Indian and notable museum collections.

The military reader will find this work valuable to him as a citizen and as a soldier. It reveals how his government and his fellow citizens have dealt with red Americans from founding times to the present. It reflects Army-Indian interaction and the measure of the Indian as an adversary. All-in-all it is a useful book.

William Gardner Bell
OCMH

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