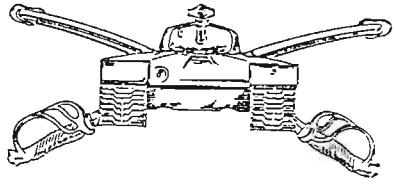
ARMOR

The Magazine of Mobile Warfare

January-February 1986

SCHWERPUNKT



In this the first issue of *ARMOR* for 1986, I want to thank all of our readers who have written to compliment us on the magazine. Knowing that the readership appreciates the efforts of our small staff and enjoys the insight of the contributing authors makes this position truly satisfying.

Our first feature of this issue, "An Introduction to the NTC," written by **Captain Mike Christie,** will be of interest to both those who have trained at the National Training Center and those who are looking forward to their first battle there. This story isn't just a scenic tour of the countryside; the author provides us with some excellent tactical tips on how to fight.

We in the United States Army have always been proud of the innovativeness of our soldiers; that quality is certainly one of our Army's strong points. The article by **Captain Judd Squitier,** "Inherent M1 Decon Capabilities," illustrates how soldiers' ideas have developed the capabilities of the M1 tank platoon to increase our chemical decontamination capability.

ARMOR also reinstitutes a feature in this issue that ran for over 25 years in the magazine: "What Would You Do?". This feature — the first of which was written by **Colonel** (later General) **Hamilton H. Howze** — puts the reader into realistic situations both on the training fields and the battlefields. I commend it to you.

"Cavalry in AirLand Battle" by **Major John Rosenberger** and **Colonel Thomas White** is the first of three articles in which the authors discuss just how Cavalry fits into our operational and tactical levels of warfare. It is an excellent appreciation.

Our historical article for this issue is "The Defense of the Vienna Bridgehead," by **First Lieutenant Peter R. Mansoor.** In the last decade, we have talked at great length about "fighting outnumbered and winning." In this extremely well-written story based on interviews, we see how one German tank crew did, in fact, fight outnumbered and won against the Soviets. Our presentation of this fine article features the illustrations of our newest staff member, **Sergeant First Class Robert Torsrud.** I know you will enjoy both this interesting article and **Sergeant First Class Torsrud's** skillful drawings.

Throughout its history, this magazine has been the leader of the Army's professional journals in bringing to its readers speculative articles on equipment and design. **Robin Fletcher,** a noted international defense writer, gives us in this issue "Trunnions on the Move," in which he analyzes the advantages and disadvantages of the conventional, turreted tank. This detailed and complex view of future tank design is well-supported and offers some intriguing alternatives.

Finally, I want to point out two other features in this issue. The first is about the Soviet's BMP-2. The article is an excellent description of this new infantry fighting vehicle and its capabilities. The second feature describes how a group of ROTC cadets have preserved the traditions of horse cavalry. **Captain Edwin Kennedy, Jr.** writes that "At Texas A&M, Cavalry Is More Than a State of Mind."

The past, the present, and the future — that's a good way to describe this issue of *ARMOR: The Magazine of Mobile Warfare.* — GPR

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FEATURES

DEPARTMENTS

ARMOR magazine (ISSN 0004-2420) is published bi-monthly by the U.S. Army Armor Center, 4401 Vine Grove Road, Fort Knox, Kentucky 40121. Unless otherwise stated, material does not represent policy, thinking, or endorsement by any agency of the U.S. Army. Use of appropriated funds for printing of this publication was approved by the Department of the Army 6 January 1984.

ARMOR may be forwarded to military personnel whose change of address is caused by official orders (except at APO addresses) without payment of additional postage. The subscriber must notify the postmaster.

CORRESPONDENCE: Address all correspondence to U.S. Army Armor Center, ATTN: ATSB-MAG, Fort Knox, Kentucky, 40121. (Telephone: AUTOVON 464-2249/2610 or commercial (502)624-2249/2610.)
SECOND class postage paid at Fort Knox, Kentucky and additional mailing office.

SUBSCRIPTION RATES: Individual subscriptions to *ARMOR* are available through the U.S. Armor Association, Post Office Box 607, Fort Knox, Kentucky 40121. Telephone (502)942-8624.
Domestic: $16.00 one year; $27.75 two years; $39.50 three years. **Foreign:** $23.50 one year; $36.75 two years. Single copies, $2.50.

USPS 467-970

LETTERS

On Soviet "Tank Destroyers"

Dear Sir,

Having just finished reading Captain Warford's article, "T-64, IT-122 and IT-130: The Soviet Advantage," I would like to share a few thoughts along this line.

As the author noted, the Soviets have on many occasions during and since World War II tested a new cannon on a tracked chassis of the artillery branch prior to mounting that weapon on a new or derivative model tank chassis. In each case historically, the cannon mounted was larger than the previous tank-mounted weapon. Thus, a case is built for watching the development of antitank capability through the developments of the Soviet artillery.

However, the point where I must disagree with the author is in his projected "tank destroyer" development as a result of the recent Soviet heavy artillery development. I am certain he is aware, though the 152-mm 2S-3 howitzer and 152-mm 2S-5 gun are both deployed on tracked chassis, neither design is in the all-telling category of tank destroyer as currently deployed. Specifically, they are both currently designed for and employed by tactical doctrine as supporting weapons, firing HE and smoke either by indirect or direct fire. Point destruction is a mission for these weapons, as for all other tracked and towed guns of the Soviet Army since World War II, but antiarmor action is a clear second. The design of the vehicles point to a Soviet appreciation, rather recent, of the western capability of self-propelled howitzers for both instant fire support and higher survivability.

If, on the other hand, we are looking at "tank destroyers," two points must be made clear. First, historically the role of "tank destroyer" was that assigned to towed guns within a unit — 76.2-mm guns during the war and the T-12 or Rapira-3 today. Second, the heavily armored assault gun (tank destroyer) designs fielded by the Soviets during the war, including the SU-85, SU-100, SU-122, ISU-122 and ISU-152, were the self-propelled artillery of the Soviet Army at that time. The guns were also turned to tank destroyer duties as the case demanded. Today, as he has noted, the Soviets field the IT-130 as a "tank destroyer," while the 2S-3 and 2S-5 fill the specific roles of SP artillery. Thus, the Soviets have managed to catch up with the West in terms of design-specific vehicles.

My primary objection then to the author's thesis is the question of, "What would be gained by attempting to mount a huge 152-mm gun for direct fire antiarmor actions?" As Soviet experience during the war points out, the separate ammunition/charge is slow and cumbersome where antiarmor action is concerned. This has been demonstrated in the considerably slowed rate of fire of the autoloaded 125-mm cannon of the T-64/T-72 tank. Of even greater concern, however, are such factors as the recoil force of the weapon, the size of the recuperators, the size of the fighting compartment to house and service the system, and the weight of the chassis required to absorb the recoil forces of the weapon. Again, as Soviet studies directly confirmed in World War II, the short-barreled ML-20 Model 1937 152-mm gun/howitzer mounted for antiarmor work required a heavy tank chassis of the KV series in the 50-ton category. By comparison, the much longer 152-mm howitzer of the 2S-3 and especially the rifled gun of the 2S-5 would seem to indicate the need for a traditional tank chassis far in excess of 50-tons. Though such a "tank destroyer" could be produced, the historical trend in Soviet tank development, including assault guns, has been to increase weight only grudgingly and never to exceed approximately 50 tons after 1941. To exceed this weight limit by a substantial margin would indeed be a remarkable step in the history of Soviet armor developments.

Also, I must point out the oversight in the author's argument, that the West has no equivalent to the IT-122 and IT-130. Certainly, at the very least, the West German Kanonenjagdpanzer-90 is a primary example of a turretless, design-specific tank destroyer. Its very name says so. Also, the Swedes long ago fielded the so-called S-Tank, which is no more than a rather more complex version of a turretless tank destroyer. To the point, however, is that the West was not convinced by the old World War II German Artillery Branch argument that assault guns (tank destroyers) cost 20 percent less to manufacture than tanks. NATO recognized that they were, in fact, 80 percent of the cost of a tank and didn't have 360-degree combat capability. Admittedly, again a case of half-empty or half-full, but a very clear-cut decision, and one made years ago.

Finally, I might suggest that far from being an "aging" design, the 125-mm hypervelocity smoothbore cannon meets the majority of Soviet requirements for penetration of NATO standard heavy tanks at long range (1,500 meters as long for Western Europe), "quick draw" fire, and simple training. It may not be perfect, and perhaps is not really as good as rifled cannons of the lengthened 105-mm (being considered for the U.S. Army) or the 120-mm L-11 of the British Army at ranges greater than 1,500 meters, but they do have the rifled 130-mm cannon in hand and in stock (according to Viktor Suvorov) and their tactical doctrine, considerably apart from ours, requires that armor close the range and fire on the move through the assault. Thus, it would seem unlikely that a requirement is in the offing for a cannon capable of identical penetration of NATO armor at twice the current range of either the 125-mm or the 130-mm cannons. Probably more the case, the Soviets learned through our years of suffering with the M-551, M-60A2 and MBT-70 that 152-mm gun/howitzer/missile launchers are at best a heartbreak in the armor field. In any event, time will certainly tell an interesting tale.

My compliments to the author for his thought provoking article.

JOSEPH R. BURNIECE
Arlington, VA

FIST-V Fails This User's Test

Dear Sir:

I am writing with some dismay, as I discover the Army has decided to buy the Fire Support Team Vehicle (FIST-V). As a team commander during the four-week test of the FIST-V at Ft. Riley, I found the vehicle to have many weak points and very few strong points.

To be specific, the vehicle had the following problems (which were pointed out by most, if not all, of the team commanders):

- The FIST-V was underpowered and overweight. As a result, it could not keep up with my tanks, M113s, and Improved Tow Vehicles. It was constantly in need of recovery because of breakdowns in the power train, and constantly becoming mired.
- In order to use the laser, the vehicle has to stop, in cover, which caused it to fall behind the moving elements of the team. After finishing the laser mission, it could not catch up.
- When using the laser, the vehicle had to button up. Therefore, the FIST was much less responsive than if he were in an M113, from which he could see me and I could point to where I wanted the fire to land.
- It could not hold all the equipment required (particularly TA 50) in an organized, easy-to-retrieve manner.
- Since it is a highly specialized vehicle, it is not suitable to be taken over for command and control purposes, as is a standard M113.

If my tank is lost or the radio is deadlined, I switch to — or "steal" — the radios from the executive officer's tank. He then goes to the FIST's vehicle. In addition, since the FIST has secure radios and my platoon leaders do not, he assumes command of the company, if both the XO and myself are lost, until the senior platoon

leader can get to the FIST track and assume command.

The TACFIRE system, the FIST DMDs, and the many radio nets are strengths, since they allow fires to be requested and delivered faster. I believe the weak points mentioned above significantly outweigh these advantages.

Because of the lack of agility of the FIST-V, the only time I was able to have responsive, in-place fire support was when I had my FIST as well as the battalion's independent lasing team. Having two teams enabled me to bound the FIST forward as I would a TOW.

I strongly recommend conversion of Bradley Fighting Vehicles into FIST-Vs. They are large and powerful enough to transport the crew and equipment and maintain the speed of the tank/infantry team in the attack. If this is not possible, then find a larger engine for the FIST-V or do not use the hammerhead to mount the laser. Adapt the laser to the caliber 50 mount instead.

MICHAEL K. ROBEL
Captain, Armor
FRG

Closing the Equipment Loop

Dear Sir:

In reading MG Brown's very well-written piece in the September-October "Commander's Hatch", I could not help but get a sickening feeling over one of his lead statements. The general's goal for his "technological leap" with BMS (Battlefield Management System) is to "get inside the enemy's decision loop, seize the initiative before he can react, and maintain this initiative so that his reactions are always inappropriate or too slow". This statement is uncanny in that it describes exactly what the Soviet research, development and acquisition (RD&A) process is doing to us. Time after time, in spite of our technological advantage, the Soviet Army fields equipment that our supposedly superior developmental hardware can barely match.

There once was a time when our numerical inferiority was said to be offset by our qualitative superiority. No more. We now frankly admit we must leap ahead, knowing full well we are qualitatively behind in most areas. But our reactions to what the USSR does in a very timely manner seem to be "always inappropriate or too slow". Why is it that it takes the US 20 years and 145 different vehicle designs to field an infantry fighting vehicle when almost every other army in the world has had one for at least a decade? Why did Congress have to tell the Army the M2 needed an antitank missile before they could fund it? How can a country like South Africa take US technology and field artillery superior to both the US and USSR while we idly look on? How can we have a record of failures like M60A2, M551, MBT70, XM803, ARSV, Shillelagh, Cheyenne, DIVAD and many other less-than-successful programs without realizing that we have serious deficiencies in our military management? The money wasted on DIVAD alone was more than the money invested in the entire US tank production capability. That failure was like burning down the government plants at Detroit Arsenal and Lima, Ohio, and starting over. Take something as mundane as trucks, which this country should know how to manufacture. Almost every army in the industrial world has military trucks with superior mobility to the fleet we field.

The President talks about a window of vulnerability in missiles. Our vulnerability is not a window; it is a barn door, and it is our inability to equip the best soldiers in the world with equipment they desperately need to defend this nation. This does not come from a lack of money; it comes from a lack of professional decision-making. It is requirements by committee and design by committee with too many people trying to run or regulate the show. the US RD&A process is managed like a Soviet collective farm. The ultimate irony is that the reason the Soviets cannot feed themselves is the very same reason why we can't equip ourselves. Until we can get a decision loop in fielding equipment (with funding that is in sync) that is shorter than the Soviets', it will continue to be Soviet initiatives that we will have to react to.

PHILIP J. MURPHY
Royal Oak, MI

Editor's Response:

Every professional in our army wants the best equipment for our soldiers, and I would tell you that for every one of the failures you cite (and I'm not convinced that any of these were *total failures,* since we've developed better equipment as a result of these projects) I can cite hundreds of successes.

We have the best tank in the world, and probably the best infantry and cavalry fighting vehicles. (By the way, Congress didn't "have to tell the Army the Bradley needed an antitank missile.")

Certainly, DIVAD did not meet our needs. As a rsult, the Department of the Army cancelled it before we spent more money on it. But the money we *did* spend certainly didn't equal the investment our government has put into our tank production capability. In fact, DOD will be able to recoup much of the investment in DIVAD by using components planned for it in other projects.

I would also tell you that our trucks are pretty darned good. Both the 5-ton and 2½-ton cargo trucks have served us well for a long time. With the introduction of the new HEMTT vehicles, our capabilities will be even greater.

What you say about the window of conventional vulnerability may have been true five years ago, but with the support of the nation, we've gone a long way toward closing that window, both in the active and the Reserve components. We have fielded hundreds of items of new equipment in all functional areas, from the preparation of meals to combat vehicles, and we've done that all very quickly. Sure, there are problems. But in almost every case, we in the Defense Department have discovered them and taken action to correct them. The Non-Developmental Initiative concept is one way to do that.

With this concept, DOD goes out to acquire and test equipment that has already been developed. This saves us both time and money. We test it, and if it's good enough, we buy it. The new M-9 pistol, the AT-4 antitank weapon, and the new field telephone systems are just a few examples of the successful use of NDI.

Finally, the "leap-ahead strategy" which MG Brown discusses is exactly what we need to ensure that any potential threat country ends up reacting to us, instead of vice-versa. What we are talking about here is not evolution, but revolution in equipment design. It will be this equipment revolution and the innovative American soldier that will help us deter war. And, God forbid, if we ever have to fight, it will be this superior equipment and those well-trained soldiers who will help us win.

--GPR

Armor Conference Is Scheduled for May 13 to 15

The United States Army Armor School and Center at Fort Knox will host the annual Armor Conference on 13-15 May, 1986. This year, a special day — the 16th — will be devoted to cavalry.

The theme of this year's conference is "Close Combat Heavy and the AirLand Battle — Needs and Initiatives."

In the next issue of *ARMOR,* we will publish a complete agenda of the conference events.

Requests for general information will be handled through the Deputy Assistant Commandant's office, AUTOVON 464-1050 (Commercial 502-624-1050). Information on equipment exhibits is available from the Directorate of Combat Developments (1555); and housing arrangements can be made through the Fort Knox Protocol office (6951).

COMMANDER'S NOTEBOOK

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

Armor Assessment, Part I: Assessing Our Strengths

Since our early days in the Forties, armor has been a leader in the innovative application of combined arms: the integration of tank/infantry teams; the integration of the helicopter into squadron formations; and today, the integration of the microprocessor into an Army of Excellence which trains, maintains, cares, and leads. It is a magnificent record which has, together with our combined arms partners and our Allies, successfully deterred war for over 40 years in our most vital external area of interest, Western Europe. We know we are good; we think we are accelerating on a sound course to stay ahead of potential threats. But are we?

This is a vital issue to the defense of our great nation, particularly the adequacy of deterrence on the European heavy battlefield against a foe whose medium of exchange is tanks. It is, therefore, appropriate to question our assessments. In fact, if we are as good as we say and think we are, we should seek assessments of our program — reviews of the present and the future. Therefore, we shall look at our challenges, primarily those posed by the Soviet Union leading the Warsaw Pact, then assess our strengths, and finally review the programs that we have underway across the Armor and Cavalry force to capitalize on our strengths.

We face a broad range of challenges. First and foremost must be the *Soviet Union's unrestrained drive toward military superiority* across a broad range of military capabilities, but most particularly for our concern in the ground maneuver heavy area. There are no apparent constraints on their drive for qualitative and quantitative superiority. We are paid the compliment of their duplication of our technologies and our equipment — our ideas, good and bad. But then they combine this with their own visions of excellence in the development and fielding of armored vehicles. In tank design, they are a world leader in their own right. Recall the technological surprise of the T-34 when it was introduced in World War II. After the fact, the T-34 was generally acknowledged as among the best, if not the finest, new armored vehicle introduced during World War II. So there is a genuine talent in the Soviet arena, combined with virtually unrestricted resources and unyielding will to dominate the maneuver heavy world.

A difficult situation has been exacerbated as their long-term development plan has come to fruition, giving them an inordinately high rate of modernization. It is probably some two to four times our modernization rate, in terms of sheer output. They have matched and, in fact, bested us in the West in the ability to produce conventional track-laying combat vehicles.

A further challenge is their linkage of equipment modernization to scientific analysis of war, that is, the development over time of the "scientific laws of war" — the norms of war which, to the Soviets, govern the ebb and flow of the battlefield. It is a logical outgrowth of their deterministic view of the world exemplified in Soviet political and economic theory. It posits the predictability of war which can be developed by detailed study. This asserted predictability is complementary to their enormous bureaucracy. It permits a clear prioritization and focusing of effort — the necessary accompaniment to a massive national armament program. Here, I am making no value judgments with respect to the quality of their analysis or the norms of battle which they have developed. But we must be

aware that they exist and that they will influence the Russians' conduct of battle, particularly at the tactical and operational levels of war.

As we know, this battlefield capability is balanced by an outmoded economic system — a system that cannot organize to respond to the basic expectations of the Russian people. So the Russians are most certainly not 10 feet tall, but they do have great current capability and future potential for maneuver-heavy ground combat. It is significant, and it is growing at an accelerating rate.

Modernization is a great challenge for the United States. There is genuine concern about the rising costs of weapons systems — what many see as an unending cycle of qualitative improvement, matched with quantitative demand at the cost of other national programs. This concern stimulates our search for new technologies or new ways to use effectively our existing investments to deter war or to fight should deterrence fail. Today this search manifests itself in the West in a drive to develop "jump aheads" — significant increases in capability which can compensate for quantitative shortages. The development and fielding of "jump aheads" has been a major preoccupation of our Armor and Cavalry force for the past several years.

Unfortunately, this challenge — which tends to quality — is matched by increasing constraints on the ability to train quality personnel to employ the "jump ahead" improvements. Unlike the Soviets, for example, we must contend with issues like the noise disruption associated with training. In all of the Western democracies, there is also increasing concern about the use of land to train. The tolerance of free citizens to support aggressive training appears to be declining, at least within the Western democracies.

These, then, are the challenges. They are substantial, but certainly not insurmountable. We — particularly in the West — have great abiding strengths. Our challenge in the Armor-Cavalry force is to capitalize upon these strengths.

Our first and probably greatest strength is the tradition and reality of Yankee Ingenuity — the fabled American ability to innovate. Given the initiative of the average soldier, we will invariably figure out a "better" way to do something. It is a characteristic of unpredictable outcome. In deterministic terms, the United States hockey team *should not* have won the Olympics, yet it *did*. Contrary to the laws — the norms of predictable human behavior — our hockey team won. This unpredictability must be a great source of uneasiness and insecurity to the philosophy and practice of the Soviet Union. This characteristic is reinforced by our culture, which is *the* dominant world culture — Coca-Cola, our music, our fashions are mimicked around the world, including within the Soviet Union. Our system exerts a magnetic attraction upon talented individuals who wish to develop as individuals — and to an Army striving to "Be All It Can Be."

We preach unbridled individualism. This individualism is anathema to the very precepts of central totalitarian control which characterize the political system of the Soviet Union. This power to the individual, which is characteristic of the United States, has been reinforced with the impact of mass media, particularly national television, which can rapidly focus our national spirit and will. National spirit is volatile, but it can be focused with remarkable intensity. It is a source of unpredictability and, therefore, uncertainty, to the Russians.

Most recently, the microprocessor extended this power in the hands of individuals by tying them together in a pervasive communications network which is expanding at an exponential rate. Innovative individuals are being given more and more capability because of this information revolution, which has thus far been quite sensibly discouraged in the Soviet Union. We face not a contest between Sparta and Athens; rather it is the contest between a ponderous tortoise and an agile, innovative, and somewhat unpredictable hare.

A second major strength which we possess is the profound integration of individuals across race and sex which has occurred within our country, and particularly within our Army, which has led the way. It is a source of great talent to us. The task of integration is certainly not complete, but increasingly it is an issue of execution. We understand the necessity of full and complete integration and we are the *only* pluralistic society possessing this degree of cohesion across race and sex. Certainly we as leaders can never become overconfident. The reinforcement of integration must be a continual concern of the chain of command. Yet the problem has been met head on, is essentially resolved, and today it provides the quality and quantity of skills essential in a volunteer force. We will face challenging days ahead in sustaining the volunteer force with changing national attitudes and a declining demographic base, but quality begets quality. With a reasonable share of national support, it should continue successfully. We must train and educate our leaders to maintain the progress that we have made and not take it for granted. It is a major source of strength which is almost uniquely ours here in the United States.

"...National spirit is volatile, but it can be focused with remarkable intensity..."

The microprocessor is also a source of great strength. It represents power decentralized to the individual, the antithesis of state domination of the individual in the Communist sphere. We apply this strength to the innovative individual with a tradition of entrepreneurship. This is combined with a knowledge of the microprocessor gained by our youth both at work and at play in the video arcades. We possessed a similar generational advantage in World War II, because our young people understood motor vehicles — a strength derived from our leading the world in mechanization. I would hypothesize that the microprocessor will have as great an impact on the battlefield as that caused by the internal combustion engine. We, as a nation, possess today a significant advantage over other

nations in this area, particularly the Warsaw Pact, and we should exploit it.

Another of our strengths is organizational in nature. Our predecessors within the Army had the foresight to develop an organizational structure tailored to take advantage of our national strengths, that is, the Training and Doctrine Command, a service command responsible for ensuring the integration of doctrine, organization, equipment, and training. No other army has brought together all of the elements of combat capability in a structure with such unity of command. We reinforced this fundamentally sound decision several years ago by establishing the role of the proponent. The school commandants became responsible for developing the doctrine, organization, equipment, and training tied to proponency — in the case of Fort Knox, for maneuver heavy, and tied to this proponency the responsibility to ensure the development of the officer and noncommissioned officer corps. Increasingly, there is both the responsibility, the authority, and the expectation that the proponent will work across the Army to ensure full and complete integration of capability — working for the major Army command and the leadership of the Army within the Department of the Army, as well as through the chain of command of Training and Doctrine Command.

Of equal and perhaps greater importance for the future is the development of a sense of longitudinal responsibility for the adequacy of the integration effort over time. We have not only assessed the strengths and the weaknesses for which we must compensate, but we have also established an institutional framework to ensure that this is done for the Army on a decentralized basis, responsive to the strategic direction of the leadership.

We have one other strength, still more latent than realized. This is the national basis of our Army, drawn as it is across a continent. More than half our Armor and Cavalry force today is in our National Guard or Army Reserve with an assured national distribution. This national distribution is combined with a large retiree population created from our substantive standing forces since World War II and our retention of the 20-year retirement policy. Here, there are highly trained individuals who we can call back in time of war to facilitate a considerable expansion should we desire to do so. Also as a function of our accession policies, we have relatively young soldiers in the IRR, or beyond the IRR, who could be available at time of national emergency. We have not yet fully thought through how to take best advantage of this strength. We will never have the bank of young veterans which we possessed at the start of the Korean War, but nonetheless, as a result of the size of our Army over the years, there is a very considerable untapped source of trained manpower within our country.

Our assessment up to this point has been primarily theoretical, but it is clear, I think, that despite the considerable challenges we face, we have some national strengths of considerable magnitude and importance. In my next column, I will examine — in more detail — the areas I believe we can exploit in order to capitalize on those strengths. Forge the Thunderbolt!

Required Manuals for Armor/Cavalry Leaders

The purpose of this list is to tell each Armor/Cavalry leader which Armor School-proponent manuals he must have to train for combat.

Battalion/Brigade Commander

FC 71-3 (Coordinating Draft), The Armor and Mechanized Infantry Brigade, Oct 85.
FM 71-2J (Coordinating Draft), Tank & Mech Inf Battalion/Task Force, Dec 84.
FC 71-1J (Coordinating Draft), The Tank and Mechanized Infantry Company Team, Dec 85.
FM 17-12-1 (Approved Final Draft), Tank Combat Tables M1, Dec 84.
FM 17-12-2 (Approved Final Draft), Tank Combat Tables M48A5/M60A1, Apr 85.
FM 17-12-3 (Approved Final Draft), Tank Combat Tables M60A3, Feb 85.
FC 71-11, The Armor Task Force Training Plan, Apr 84.
FC 71-4, Combined Arms Live fire Exercise (CALFEX), Jul 85.

Squadron/Regiment Commander

FM 17-95(H) (Approved Final Draft), Cavalry Operations, Oct 83.
FC 17-102 (Coordinating Draft), Reconnaissance Squadron (LID), Mar 85.
FC 17-102-1 (Coordinating Draft), Reconnaissance Squadron (LID) ARTEP Mission Training Plan, Sep 85.
FC 71-3 (Coordinating Draft), The Armor and Mechanized Infantry Brigade, Oct 85.
FM 71-2J (Coordinating Draft), Tank & Mech Inf Battalion/Task Force, Dec 84.

Company Commander

FC 71-1J (Coordinating Draft), The Tank and Mechanized Infantry Company Team, Dec 85.
FM 17-12-1 (Approved Final Draft), Tank Combat Tables M1, Dec 84.
FM 17-12-2 (Approved Final Draft), Tank Combat Tables M48A5/M60A1, Apr 85.
FM 17-12-3 (Approved Final Draft), Tank Combat Tables M60A3, Feb 85.
FC 17-16-1, Div 86 Tank Heavy Co/Tm ARTEP Mission Training Plan, May 84.
FC 71-5, Fire Coordination Exercise, Jan 85.
FC 71-7, Situational Training Exercise (STX) for Logistics, Apr 84.
*FM 17-15 (TEST), Tank Platoon Div 86, Oct 84.
FC 17-15-1, Tank Platoon ARTEP Mission Training Plan, Jan 84.
Division 86 Tank Company SOP, May 83 (will be published as FC 71-1-3 in Mar 86).

Troop Commander

FC 71-5, Fire Coordination Exercise, Jan 85.
FC 71-7, Situational Training Exercise (STX) for Logistics, Apr 84.
FM 17-95(H) (Approved Final Draft), Cavalry Operations, Oct 83.
FC 17-101 (Coordinating Draft), Light Cavalry Troop, Sep 85.
FC 17-101-1 (Coordinating Draft), Light Cavalry Troop ARTEP Mission Training Plan, Sep 85.

Tank Platoon Leader/Platoon Sergeant

*FM 17-15 (TEST), Tank Platoon Div 86, Oct 84.
FC 17-15-1, Tank Platoon ARTEP Mission Training Plan, Jan 84.
FC 17-15-2, Tank Platoon Leader's Notebook, Jan 84.
FC 17-15-3, Tank Platoon SOP, May 85.
FC 71-1J (Coordinating Draft), The Tank and Mechanized Infantry Company Team, Dec 85.
FM 17-12-1 (Approved Final Draft), Tank Combat Tables M1, Dec 84.
FM 17-12-2 (Approved Final Draft), Tank Combat Tables M48A5/M60A1, Apr 85.
FM 17-12-3 (Approved Final Draft), Tank Combat Tables M60A3, Feb 85.

Scout Platoon Leader/Platoon Sergeant

*FM 17-98 (Approved Final Draft), Army 86 Scout Platoon, Jan 85.
FC 17-98-2, Scout Platoon Leader's Notebook, Apr 85.
FC 17-98-3, Scout Platoon SOP, Apr 85.

All commanders and leaders should have SOPs and references for echelons one level above and one level below them.

Manuals denoted with an asterisk (*) are DA print and must be secured from AG Publications Center in Baltimore. All other manuals are available in limited quantities from the Armor Center and can be ordered by calling The Army Wide Training Support Branch, Non-Resident Training Division, at AUTOVON 464-2914 (Commercial 502-624-2914) or by writing: Commander, U.S. Army Armor Center, ATTN: ATZK-DPT-NRT-AWTS, Fort Knox, KY 40121-5000. Inquiries about publication of future manuals should be directed to the Armor Hot Line, AUTOVON 464-TANK (Commercial 502-624-TANK).

DRIVER'S SEAT

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Armor Safety: "The Six-Paragraph Operations Order"

Recent messages from the Chief of Staff of the Army and the Sergeant Major of the Army have challenged the Noncommissioned Officer Corps to police safety standards in the Army. Every command has had meetings and classes to discuss the views of those messages and to review the five points of safety discussed by the Chief of Staff.

Let's look at safety in Armor and review the leadership responsibilities of its noncommissioned officers. Most of us would naturally respond that the Armor Force is the most safety-conscientious branch in the Army, for all the right reasons. We know that those tanks and personnel carriers will injure or kill a soldier. We emphasize safety in everything we do. We know our equipment!

At Fort Knox, we also had meetings to discuss command policies and programs in each major command. We shared each others' concerns, a great learning procedure. Let me share with you some ideas that greatly assist in preventing accidents and injury.

First, we must start with the individual. Why? Because it is the individual who must initiate the defense against accidents and injuries. Let's look at a few basics that challenge our leadership skills. Individual clothing and equipment can be a soldier's best friend and worst enemy, depending on the chain-of-command attitudes. Those leaders who actually perform periodic inspections for accountability and serviceability in a timely manner prevent numerous types of injuries, especially those associated with weather. However, the success of those inspections must be amplified by the commander and the leadership of the organization. Sometimes we forget the purpose of a "command". Look around your organization two hours after the commander has prescribed the uniform of the day. Are there soldiers out of uniform? Some might say, "Who cares? We are in garrison now." But soldiers who ignore their leadership in garrison ignore their leadership in the field. And noncommissioned officers who allow their soldiers to ignore orders in garrison do the same in the field.

Let's leave the individual and address the team — crew, squad, section, etc. — each has a leader. The noncommissioned officer is the only leader who has total supervision over his soldiers. Besides his soldiers, he has responsibility over the equipment associated with a squad or crew. To supervise squad/crew safety properly, a noncommissioned officer must know how his equipment works and how to use it. You show me a noncommissioned officer who does not know his vehicle and weapons, and I'll show you an accident looking for a place to happen. You can pin on a set of stripes and assign an MOS to an individual, but a leader is lost if he does not know the equipment. A noncommissioned officer must grow with the equipment. He has to work with equipment, learn its pitfalls, and anticipate dangerous actions or attitudes. We need to ensure that our institutions tie safety in with training. We need to train noncommissioned officers visually to recognize accident-preventive measures — the right and wrong way to slave a vehicle, to ground-guide, to replace a track. He must visually identify safety problems before they happen and take corrective actions.

Knowing the vehicle and the equipment is not good enough! The leader must maintain discipline. The discipline of a crew is really demonstrated in the field where the vehicle becomes a part of the crew, day and night. The discipline of both the leader and those soldiers assigned are really exercised in the field environment.

The concern of the noncommmissioned officer must now expand beyond his equipment. He must thoroughly understand the safety requirements in the Standing Operating Procedures (SOP). Unit SOPs should cover safety management rules laid out by the command. The assembly area of a tank company or an armored cavalry troop is a busy and dangerous place, especially at night. We cannot tolerate unsupervised sleeping rules and vehicle control — a noncommissioned officer's responsibility.

Finally, let's discuss the command role in safety as it applies to the first-line supervisor: we cannot overemphasize leadership by example. The uniform of the day applies to everyone in the organization, the commander who designated it, the first sergeant who

announced it, and the platoon leaders, platoon sergeants, and first-line supervisors who have the responsibility to check the soldiers and make corrections. If a noncommissioned officer cannot supervise a simple order, then the more complex orders become impossible. You cannot have different rules! Soldiers don't understand different standards; but more importantly, a soldier is not going to follow a leader who does not follow standards himself. This applies to anything we do — from the simplicity of the uniform of the day to the complexities of unit movements, an all-night occupation of a blocking position in sub-zero temperatures, river-crossing exercises, or a passage of lines where the slight mistake of not knowing the location of your flanks or field of fire can be fatal. Sleeping in your vehicle, not knowing how to ground-guide properly, and a multitude of other mistakes can lead to serious injury or death. We do a great job preparing to go to the field, but most of our accidents occur returning from the field, mostly due to unsupervised movements by the leadership of the organization.

How do we transmit the orders? In written format, in classes, in formations? One of the ways that was discussed by a brigade commander in our meetings was the use of the Six-Paragraph Operations Order: situation, mission, execution, admin and logistics, command and signal, and SAFETY. Every noncommissioned officer in our Army learns the Five-Paragraph Operations Order in the Primary Leadership Development Course. The Six-Paragraph Operations Order (adding safety in training) will greatly assist every commander in the execution of the mission. By adding this factor to the SOPs, we have developed a standard understood by all noncommissioned officers. It is not tank lingo or artillery lingo; it is something that all soldiers understand — a simple procedure that is disseminated by the chain of command, supervised and enforced by the noncommissioned officers. Using this system will greatly enhance a unit's safety program.

There is a lot of pride in soldiers who belong to a unit that has had no major safety incidents. I have had the opportunity to belong to units such as these. A Reforger exercise or a major gunnery exercise in January with a troop/battalion/regiment/brigade returning with all its soldiers free from major injuries is a satisfying accomplishment. It is not easy; it is tough. It requires a lot of preplanning, execution, and supervision. Sometimes a relief of a leader is in order because of poor leadership, but it must be done. Sometimes UCMJ actions are necessary because an *order* was not followed, and that must be done. The important point is that command involvement and noncommissioned officer involvement prevent accidents or injuries.

TLC for AN/VVS-2

Armored crewmen — attention! Your AN/VVS-2 Night Vision Viewer is a delicate instrument that demands a lot of gentle, loving care. If you treat it roughly, you can be in for some rough nighttime treatment on the battlefield without your "eyes."

Treat your AN/VVS-2 tenderly; learn its limitations, and use it only when conditions are right.

The Night Vision Viewer does *not* make its own light. It only increases the low-level light available on a normal night. Cloudy nights with no moon or stars won't produce enough light to use the viewer.

If the night is extremely dark, or the weather conditions are poor, adjust the viewer to maximum resolution. If that doesn't help, *stop your vehicle* before you have an accident. Get some guidance. If you can't see well, even with your viewer, remember that nobody else can see well either. So, rather than taking a chance, exercise caution. Let your vehicle commander know the problem.

A few words of caution. *Never* expose the viewer to direct sunlight, and *never* use the viewer when there's lightning around. Strong, direct light will blind your viewer, and you, in turn, will be night blinded.

When your viewer is not in use, keep the head assembly covered, whether it's mounted for use or stored. Protect that head! If you need a cover, NSN 5855-01-066-4398 or 5855-01-027-1553 will get you one.

When you don't need the viewer, store it to protect it from bumps and shocks that can snap power receptacles or knock its insides out of whack.

Before you store your viewer, disconnect it from the power source and make sure the batteries are out. This will prevent corrosion.

Never plug in the viewer when the batteries are in place — the batteries will explode.

When you store the viewer, make sure that it's in its box snugly. Lock all the box latches so that the viewer won't fall out.

You'll find the storage box in different places in different vehicles.

On the M1, it's to the left and rear of the driver. On the M60A3, it's underneath the gun breech.

The M2/3 Bradleys do not have viewer storage boxes, so you will have to strap it firmly to a storage pad to the left of the driver.

Take care of that viewer! It's an expensive piece of equipment, and more importantly, it's your "eyes."

RECOGNITION QUIZ

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

(Answers on page 49)

An Introduction to the NTC

by Captain Mike Christie

To most of you, it's known as the National Training Center — the NTC. To me, and to many others who served there, it was "home" for nearly three years. But for all of us, the NTC offers the finest maneuver and live-fire area in the world. In this article, I want to give those of you who have not been to the NTC a look at what you can expect. For the many of you who have fought on that battlefield, this article will serve as — I hope — a confirmation of what you experienced and as a sort of lessons-learned packet to improve your training experience when you return.

What is the NTC?

Located in the high desert north of Los Angeles, California, the NTC is approximately 1,000 square miles of open terrain, broken up by granite and lava mountains and hills. There are about half a dozen dry lake beds that gather water during the winter but then dry to a hard clay during the summer. That summer is nearly nine months long.

Newcomers to this land find the fluctuating temperature the most difficult adjustment to make. While it is common knowledge that the daytime temperature is usually above 100 degrees, few people realize that the temperature at night often drops 40 to 50 degrees. That swift drop in temperature makes you feel extremely cold, even though the actual temperature might be as high as 70 degrees. And the wind makes the cold at night seem even worse.

The wind never seems to end, and it penetrates everywhere. It numbs your face when you are moving against it, and its presence is compounded by the fact that there is no refuge, no trees or manmade structures to provide protection. But even more important than its effects on your body are the wind's effects on your tactical operations.

The wind can become a formidable ally if you capitalize on its strengths, but it can be a considerable enemy if you fail to take into account its impact. The simplest task, such as putting up a tent, becomes difficult and takes longer to accomplish. The wind can carry sounds great distances, or permit you to operate close to the enemy without being heard. It can play havoc with the performance of your ground surveillance radars and make them the source of much false information. But the wind's greatest impact on operations is its effect on the use of smoke.

Those who have fought at the NTC know that smoke operations play a key role in the OPFOR's ability to move on the battlefield. Far too many times, however, visiting Blue Force units fail to consider the wind's direction, its strength, or changes in wind conditions when they employ smoke. You must routinely sample the wind's direction. These frequent checks become more important just before sunrise until just after the sun has risen and the ground begins to get the effects of the sun's heat. As these ground temperatures increase, wind direction and speed can change dramatically; frequent, routine checks can either confirm the wisdom of your smoke plan or warn you to make changes if the plan might endanger your forces.

Another physical aspect of the NTC which often surprises new arrivals is the vastness of the area. While the openness of the terrain allows you to see the enemy at a much greater distance, it also prevents you from moving undetected, or makes it nearly impossible. It's not uncommon to be able to observe enemy formations of battalion strength for 30 or 40 minutes before they close into direct fire range. So in this vastness, you must use your imagination in the use of existing cover and concealment, and rely on speed, darkness, and smoke.

The Observer-Controllers

The observer-controllers are a contingent of commissioned and noncommissioned officers whose job is to see that the visiting unit meets its training objectives. The observer-controllers do this by observing how the unit trains, controlling the flow of the unit's operations — without sacrificing the realism of the situation — and by offering candid after-action reviews for the soldiers of the visiting units.

All Photos by Michael Green

Visiting units are often surprised by the vastness of the NTC, with almost unlimited visibility but little cover.

The OPFOR Contingent, which fights units in 14 rotations a year, may be the best prepared "Soviet" unit in the world.

Quite frankly, they don't have an easy job or one that is much fun, but they do have perhaps the most important job at the NTC. While they are not members of a TOE unit, they observe thousands of soldiers from hundreds of units in all sorts of training situations on the most realistic battlefield in the world, short of an actual one. These dedicated soldiers learn lessons that are reinforced through *repetition,* the foundation of training. So when an observer-controller recommends a better way to accomplish your mission, you can bet that he knows it usually works and works quite well. You may not agree with him, and you may go ahead and do it your way. That's all right, too. If it works, the observer-controller has just learned a new technique that he can pass on to other units. If your technique doesn't work, then you've learned something, too!

The OPFOR

Whenever you talk about the NTC, you inevitably get around to talking about the OPFOR, the "bad guys." The first point to consider is that the OPFOR are soldiers of the United States Army, and these soldiers like to win just as much as you do. But don't kid yourself: cheating simply is not tolerated in the OPFOR. The mission of the OPFOR is to provide the most realistic threat situations possible under existing personnel and equipment constraints — and to do that according to correct Soviet doctrine each and every time. You often hear the words "awesome," or "incredible" when someone describes the OPFOR. But again, don't kid yourself. They *can* be defeated.

But there are a few factors that make the OPFOR effective in combat testing the tactics and training of the visiting unit.

The first of these advantages is that the soldiers of the OPFOR are acclimatized to the desert's effects. The OPFOR soldiers know what to expect in terms of temperature, wind, darkness, and the sand. The second factor which may give the OPFOR an advantage is that they know the terrain. In the course of planning for their operations, the OPFOR usually has a good idea of what to expect in terms of observation, fields of fire, cover and concealment, avenues of approach, and obstacles to movement.

The OPFOR also knows his enemy: YOU. The OPFOR fights visiting units in fourteen rotations a year (That's 28 maneuver battalions.). Hence, the OPFOR can fairly well guess at what course of action the visiting unit will take in a given tactical situation. Additionally, the OPFOR *is* a United States Army unit, and as such must go through their own ARTEPs. Finally, the OPFOR has the advantage of numbers in vehicles and weapon systems, but that advantage is one that our potential adversary of the real world would have, too. So what does that all add up to? In short, when a visiting unit comes into contact with the OPFOR, that visiting unit is fighting probably the best prepared "Soviet" unit in the real world. *But the OPFOR does suffer from some disadvantages too.*

The first disadvantage that the OPFOR has is that, like any other U.S. unit, the OPFOR has a problem with personnel turbulence. There are always people on leave, people on sick call, people in schools, and people on detail. All of these things take away soldiers who could be fighting you on the battlefield.

A second disadvantage is that the OPFOR fights from VISMODs. Most of these vehicles are quite old M551 Sheridans that have been visually modified to appear somewhat like Soviet combat vehicles. While the OPFOR does an excellent job at maintaining their equipment, these vehicles are out fighting nearly every week, and even the best-maintained vehicles wear out.

Another disadvantage is that normally the OPFOR is short on infantry, though this is being remedied with some augmentation. Additionally, until the OPFOR is fully equipped with VISMOD M113A1s (made to look like BMPs), it will be difficult to move the infantry soldiers quickly around the battlefield. A final disadvantage, of which I will say more later, is that the OPFOR does not have thermal sights.

The Attack

Up until this point, I have tried to show you what you can generally expect at the NTC. Now, I am going

to give you some "food for thought" in terms of the actual tactical operations that you will conduct at the NTC.

One of the missions that you will perform will be the deliberate attack, usually both in the day and night, against an OPFOR reinforced motorized rifle company (MRC) in the defense. The MRC will usually consist of 4 T72s, 10 BMPs, 63 dismounted infantry, 9 Vipers, 4 Dragons, and 1 ground-mounted .50 cal. machine gun. (The assortment of U.S. equipment is used to replicate similar equipment found in the actual Soviet MRC or attached to it.) The biggest weakness of the MRC is the small number of infantry available to him to defend the terrain that he is assigned. (Though, as I mentioned earlier, augmentation of infantry will help in this area.) This problem of the MRC commander is compounded when he is fighting against a J-Series MTOE battalion task force which contains usually four maneuver companies that can attack from two different directions at the same time. The MRC commander cannot rapidly shift his infantry around unless he is fully equipped with the new BMP VISMOD made from an M113. Hence, the MRC commander must try to position his infantry where they will do the best job, knowing that any attempt to reposition them during the battle will be slow and will expose them to the effects of indirect fire. Another disadvantage of the defending MRC commander is his relative lack of counter-surveillance and reconnaissance assets.

The OPFOR does not have any thermal sights or night vision goggles, and has only IR sights on the combat vehicles and a minimum number of passive sights for the crew-served and individual weapons. The MRC will be augmented by a ground surveillance radar (GSR), though. This situation forces the MRC commander to rely heavily on the GSR, OPs, LPs, and indirect illumination (which he usually wishes to conserve until the bulk of your forces are in his designated kill zone) to provide him with early warning at night and when his observation is limited by your effective smoke operations. While the MRC is normally reinforced with a part of the regimental reconnaissance screen (one BMP, one BRDM, and one motorcycle), his biggest worry remains the possibility that your dismounted infantry will attack or infiltrate during periods of limited visibility.

Not only is the MRC commander concerned with his ability to identify your possible dismounted attack or infiltration — but he is also concerned about how to deal with it. Just about his only recourse is to use indirect fire. His lack of night vision devices almost totally eliminates the MRC commander's ability to maneuver his forces around the battlefield quickly and without unnecessarily exposing them to direct fire or exposing his dismounted infantry to indirect fire. In addition to the problems of identifying and reacting to your limited visibility attack, the OPFOR's BMPs, T-72s, and SAGGERs are reduced to about a 1,000-meter effective range at night because of the limited capability of infrared searchlights. You can reduce that capability even further if you can put effective smoke on his position and keep it there.

In attacking the OPFOR, you must continually apply pressure and never let him rest; certainly, that is his objective when he attacks you. The MRC commander will usually begin to operate his GSR soon after darkness begins. You can capitalize on this. The GSR will normally be positioned near to the MRC commander so that he can quickly receive any information that the GSR can give him on your intent. You need to position your GSR teams so that you can get a fix on his GSR. That will tell you just about where the enemy is: the MRC commander is usually in the center of mass of his defensive position and located behind the platoon battle positions for security.

After identifying the MRC's location, you need to position your GSRs so that they can interfere with his radar on a sector that you can exploit. This interference should begin only after you have initiated a small deception, on a different axis, by using tinfoil to create false images on the MRC's radar. This action will begin to apply the pressure on the MRC commander because he will first become concerned about the "force" that his radar identified and then will become even more concerned about the loss of his GSR's capability when you begin to jam it.

To compensate for this lost capability, the MRC commander will attempt to offset the problem by increasing his OPs and LPs and possibly even by using patrols. That will increase the fatigue of the MRC's soldiers as the night goes on.

In order not to lose this initiative of pressure, you now should request a round of illumination every hour in the vicinity of the known enemy GSR location. That will increase the MRC commander's anxiety by making him think that someone is trying to observe his position from a nearby location. He will also probably increase his state of alert and make an effort to locate the phantom observer. This will further increase the fatique of his soldiers, and as the night continues and the fatique sets in, the MRC's soldiers — like all soldiers of the world — will become less and less concerned (and less alert) about "cries of wolf." Using helicopters to fly within hearing distance, on different axes, in simulated airmobile operations will also enhance this deception effort. If possible, deceptive radio traffic could also increase OPFOR anxiety since it is not uncommon for the OPFOR to search and monitor enemy radio traffic.

The next phase of the attack should have the task force's dismounted infantry closing toward the MRC's position. The first part of this phase is to reinforce the task force scouts with a dismounted element of infantry. Their mission is to fix and destroy the OPFOR reconnaissance element. For that reason, they should have sufficient night-vision equipment, man-carried antiarmor weapons, and the ability to request and adjust indirect fire. You should cover this action with feints by armored vehicles in order to distract the OPFOR recon element. Even if the

enemy recon element is not destroyed, these efforts should force its withdrawal and thus increase the anxiety level in the MRC position.

Next, infantry should be task organized into two or three separate elements and move out toward the MRC position on at least two — or preferably three — different axes of advance. This movement will be assisted by the hourly illumination round falling on the MRC's position.

One of these infantry forces has the mission of locating routes, obstacles, and possible enemy positions that will affect the follow-on assault forces and vehicles. This first force must have radios in sufficient number so that, if they are taken under fire and have to split up, they can continue their mission in reporting critical information to the follow-on forces. That is their first priority. If they locate barriers, this first force should not spend time attempting to breach them; this force should mark and report the barriers so that follow-on forces can breach them. Another mission for this first force might be to set up OPs to maintain continuous observation of the battlefield for the task force commander. When this first infantry force completes its mission, it should depart and return to the task force location, or a pick-up point, following a different route than will be used by the follow-on forces in their mounted attack. This will minimize the chance that the follow-on force's attack route will be discovered by the OPFOR before the mounted attack.

The second infantry force — the dismounted assault force — should then approach, or preferably infiltrate into, the MRC's position so as to be ready to attack and destroy enemy vehicles as the mounted attack commences. This force must have the majority of the task force's man-portable antitank systems so that if it is discovered, it can break up into small killer teams and continue its mission. This dismounted assault force must be prepared to cause all sorts of confusion within the MRC's position as the attack begins. It should also be briefed on the predesignated signal that will alert all the infiltrated elements that preparatory artillery fire will start within a designated time for a designated period. This briefing should also include a signal which permits warning the assault force of any change in the attack time and the preparatory fires so that the force can take cover and can assault at the correct times.

You should plan for the use of smoke during the movements of these infantry forces so that you can conceal their movements and inhibit the MRC's capability to react. Plan this smoke in front of the moving forces and on the MRC's position until the dismounted assault force is in its assault position.

Once the task force scouts have eliminated or driven off the OPFOR recon elements, the scouts can be used to recon or clear anticipated armor routes of advance and then be positioned to guide the main mounted attack.

These infantry efforts can, if successful, cause the OPFOR defense to collapse prior to the scheduled attack time. You should take this possibility into consideration in that the armor attack force must be prepared to begin its attack ahead of schedule. If you cannot attack ahead of schedule, the dismounted assault force should make every effort to remain undetected until the main attack commences. Then the mounted attack and the dismounted assault should occur simultaneously.

If attack helicopters are available, they should only be committed upon the collapse of the enemy's defense in order to catch the MRC while attempting to reposition. These valuable assets should never be sent directly into a prepared enemy position. The infantry carriers or Bradley Fighting Vehicles without their squads (those belonging to the dismounted assault force) should move as a unit in the armor attack to give the impression to the MRC commander that he is facing a full-strength mounted attack. Of course, these vehicles should be prepared to support the attack by fire.

I do not intend what I have written here to be a blueprint for victory. As we all know, the factors of METT-T have great impact on what you do on the battlefield. However, the OPFOR does have weaknesses that you can exploit as you attack.

The Movement to Contact

A visiting battalion task force normally conducts a movement to contact against a reinforced motorized rifle battalion (MRB) of the OPFOR. That unit will normally consist of 31 BMPs, 13 T-72, 2 ZSUs, 2 BRDM (AT-5s), and 6 122-mm howitzers. The number of BMPs can be higher if additional vehicles are present to replicate certain combat support elements from the regiment.

The lead element of the MRB will be a combat reconnaissanc patrol (CRP) consisting of 3 BMPs. The CRP's mission is to find you and destroy you if he can. If he can't, the CRP will "hunker down" and try to fix you until the MRB's forward security element (FSE) can arrive to either destroy you or thicken the battle until the main body of the MRB arrives.

The key elements here are that the FSE follows the CRP by up to 10 kilometers, and that the main body of the MRB, which is the advance guard of the regiment, follows the FSE by another 5 or 10 minutes. This knowledge allows you to plan to ensure that you arrive at the point of contact "first and with the most."

The FSE will consist of the remainder of the lead MRC and will consist of the remaining 7 BMPs and 4 T-72s. The important fact here is that you have the opportunity to attack and deal with one company at a time. You will have 15 to 40 minutes to deal with this company before confronting the main body of the advance guard. This affords you the opportunity to use attack helicopters, too, since it is highly probable that the ZSUs will be moving with the main body. Additionally, the rapid emplacement of OPs and small antitank killer teams on key terrain can also provide effective indirect fire adjustment on request, and can serve to deny the OPFOR this same terrain.

As the task force concentrates, the FSE commander will realize that he is outnumbered and that he must go into a hasty defense until help arrives. It is at this point that the OPFOR is most vulnerable. The BMPs are greatly degraded when moving since they posssess no STAB system, and this makes their 73-mm gun practically useless. The BMPs are also unable to fire the Sagger on the move. These BMPs are now easy game for all of your vehicles except the M113.

With the addition of the M1, M2, and M3, your chances of success during this running gun battle are even greater. Even against the OPFOR T-72, you can outmaneuver and outshoot him in mobile combat. You have greater range, and with your greater speed you can easily maneuver out of his range while you pick off threat vehicles at will.

Once you have identified the route that the main body is using — usually the same one that the FSE used — you should start to smoke that route in front of the enemy main body. The smoke will slow his advance and hinder his ability to deploy into combat formation. Anything you can do to slow the main body down will give you more time to complete the destruction of the FSE and prepare to take on the main body. This is another good time to use attack helicopters; they should try to pick off enemy vehicles as they come out of the smoke. The attack helicopters should engage ZSUs, tanks, and BMPs in that order.

I also recommend that you consider off-loading a portion of your infantry soldiers — on key terrain if possible — so as not to chance their loss in the maneuver battle. They can be transported to key terrain by other means or given the mission to defend the trains until the maneuver battle is complete.

OPFOR Offensive Operations

The OPFOR relies very heavily on intelligence that it receives when it is about to attack visiting units. The OPFOR offensive operations are characterized by simplicity and regimentation — just like those illustrated by Soviet doctrine. Hence, intelligence — good intelligence — is the OPFOR's key to planning its maneuver.

The regimental staff even prepares its artillery plan from that intelligence because the OPFOR considers artillery fire as a form of maneuver. The plan is essentially a schedule of fires that fall based upon the predetermined rate of movement for the regiment in the attack.

Don't believe, though, that the OPFOR is totally without flexibility. The regimental staff does plan for contingencies, and if updates to their intelligence indicate that the original plan will not be appropriate, the OPFOR will change its plan to accomplish its mission.

To gather this vital intelligence information, scouts from the regiment deploy at different time intervals along different axes of advance. Normally, motorcycles will move out first, around midnight if the regiment is to attack at dawn, The mission of these motorcycle scouts is not only to gather intelligence on where your positions and obstacles are; they are also tasked to penetrate deeply into your sector and set up OPs.

About 1 to 2 hours after the motorcycle scouts depart, the scouts and engineers, mounted in BMPs and BRDMs, move out to clear the obstacles reported by the earlier scouts. The BRDMs will move so that they can cover their movement with the noise of the BMPs. In this way, if the BMPs are discovered because of their noise, the BRDMs can slip around the confusion and continue to infiltrate into your rear area.

The OPFOR will also use dismounted infantry to attempt to infiltrate your positions. Their mission is to attack at first light, simultaneously with the main mounted attack and as the lead MRBs close in on the initial obstacle locations.

How can you overcome these tactics? First of all, you must be extremely concerned about OPSEC. Light and noise discipline are man-

"...It is better sometimes to hide and fight later than to die on the move..."

datory if you don't want to give away your positions to the regimental scouts. Secondly, you must cover barriers and obstacles with fire. When the scouts attempt to find them or clear them, destroy the scouts and ensure that the obstacles can still accomplish their purpose when the main attack comes. Finally, make maximum use of all of your night vision capability to discover, report, and destroy the OPFOR intelligence gathering units.

Your Successful Defense

The success of your defense will depend on how well you can deny the OPFOR the intelligence that it so desperately needs to conduct its attack. You must fix responsibility for that mission, not only at the FLOT, but also in depth. Failure to do this has caused great confusion in visiting units, and on many occasions has caused friendly fratricide and assisted the OPFOR regimental scouts in their attempts to locate friendly positions and penetrate deeply into the rear area.

A company team commander should have a small reaction force available at his location, so that even if the command net is jammed, the reaction force can be ordered out quickly. The team commander also should position his combat vehicles closer to avenues of approach during periods of limited visibility to ensure that OPFOR vehicles can't slip by.

At the battalion task force level, there must also be a larger reaction force available under the command of a key leader who can personally maneuver that force to stop any penetration reported by other elements. Infantry should be organized into antitank killer teams and dismounted elements. This will allow you to make the best use of your weapons systems. For example, tank killer teams can be placed in depth along the likely vehicle avenues of approach to reinforce company teams. By working with the company teams, the tank killer teams can assist in providing good security and support the company team's sleep plan.

The organized dismounted infantry need to sleep during the day as much as possible. Their primary jobs are done at night. These teams will not only gather intelligence through active patrolling, but will repel and destroy the OPFOR recon elements who try to find and destroy your obstacles.

Don't leave .50 caliber machine guns in the rear of the battle area. Position them in groups or pockets along likely avenues of approach. These weapons can take out BRDMs and BMPs. Groups of four heavy machine guns in mutual support straddling likely avenues of approach can be very effective.

As much as possible, company team commanders should use their soldiers to put in wire and mines, freeing engineer units to prepare the barriers and the fighting positions so important to survivability. Soldiers from the service support elements should also be used to emplace barriers and provide security so that infantry can rest for the battle; they will be up all night.

You should concentrate the fires of all tank-killing systems on T-72s. BMPs are less formidable and all systems down to the 50-caliber can kill them.

Use sniper tactics. Designate TOW systems to pick out all enemy vehicles with numbers ending in a 6. These are command vehicles; taking them out will limit the OPFOR's flexibility.

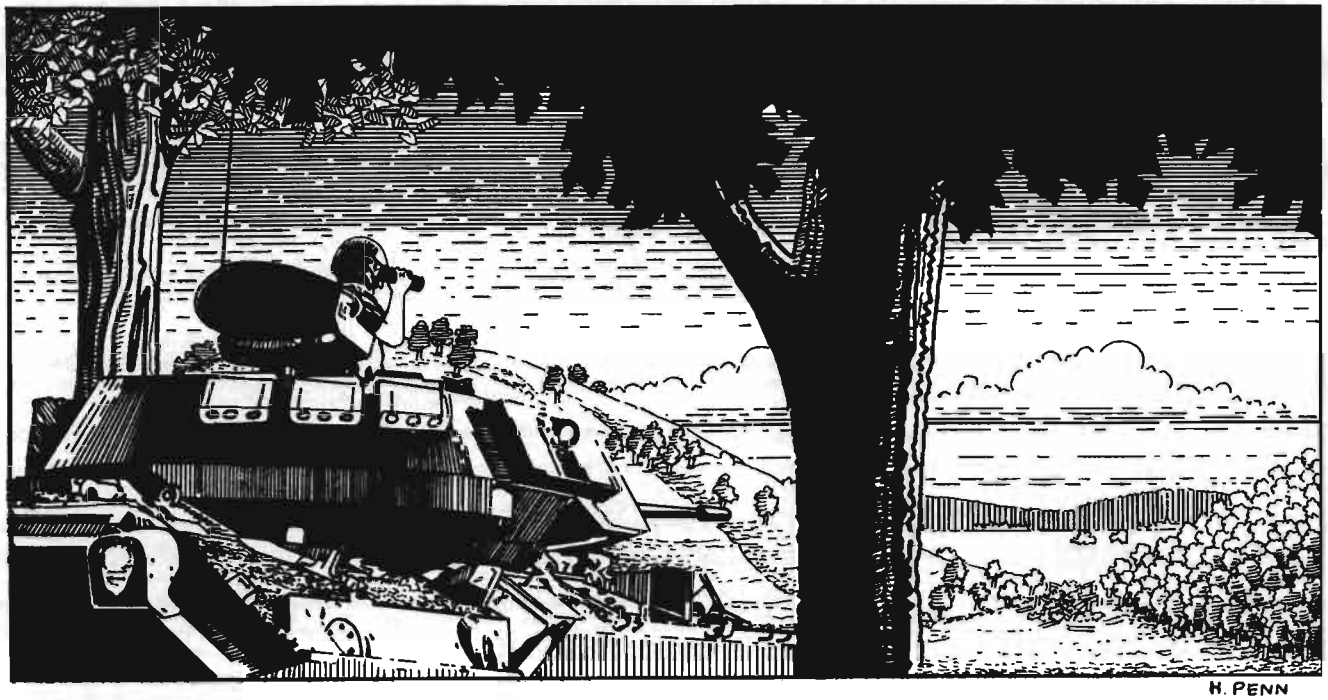
A good way to cover barriers is to dig your OPs in close to them, in spider holes if possible. These close-in OPs can detect OPFOR breaching elements in smoke or darkness more effectively than can vehicles in battle positions.

Finally, keep in mind that any small elements or even individual vehicles of your force that the OPFOR bypasses in their attack can cause extreme difficulties for the OPFOR's follow-on battalion. It is better sometimes to hide and fight later than to die on the move.

Summary

My purpose here has not been to tell you how to beat the OPFOR, but to pass on some of the lessons I have learned. These lessons can make you and your force more capable on any battlefield in the world. And that is the purpose of the National Training Center.

CAPTAIN MIKE CHRISTIE was commissioned in Armor in 1976 following OCS at Fort Benning. He has served as a tank platoon leader, tank company XO, support platoon leader, and battalion and squadron motor officer in assignments in CONUS and USAREUR. He has also served as a squadron communications officer, tank company commander and headquarters company commander and is presently assigned to the Company Team and Cavalry Division, Command and Staff Department, USAARMC.



H. PENN

The Scout Platoon

Actions on Contact/Clearing an Obstacle

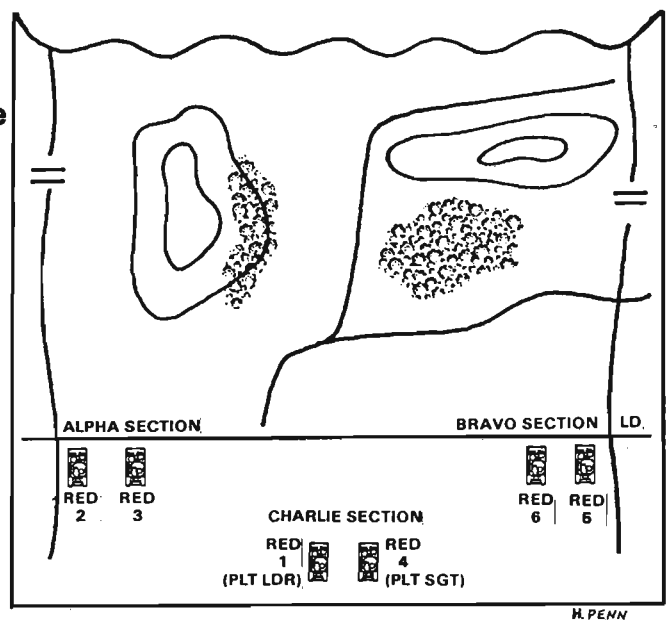
Situation

You are the platoon leader for the scout platoon in 2d Battalion, 14th Armor, which has been in combat for several weeks. You have just left the battalion command post where you received the following order from the battalion S3:

> "Elements of the 3d Motorized Rifle Division are continuing their delay. You are to conduct a hasty zone reconnaissance in sector, forward of the Bn to PL Eagle, short of Obj Blue. Report when set on PL Eagle. Time now is 2100 hrs, you will cross the LD at 0400 hrs tomorrow morning. The first company will cross at 0500 hrs, but will be ready to move at 0400 in case you make contact with a large force and need support."

You issue your warning order and start to prepare your plan. During your map reconnaissance, you discover that your sector is roughly 5 kilometers wide and 24 kilometers from the LD to PL Eagle. You also discover several chokepoints which will canalize your battalion. After considering the factors of METT, you elect to use the three section organization, and complete your plan.

Time now is 0345; your order has been issued and your platoon is deployed along the LD waiting for 0400 (Figure 1). Your platoon is 100% operational. It's finally 0400, and you order Alpha section to cross the LD and move to their first checkpoint. You report to higher that you have crossed the LD and proceed to maneuver your platoon to PL Eagle. Approximately 12 kilometers from the LD, Bravo section, which is maneuvering in the eastern part of sector, reports an abatis obstacle, reinforced with steel girders at a choke point you previously plotted on your map. Knowing that the obstacle is probably being overwatched by the enemy,



H. PENN

you have Bravo section move using cover and concealment to dominant terrain to locate the enemy force. Once they report "Set", you order Alpha section to locate a bypass to the west and move to dominant terrain forward of the obstacle to provide forward security for possible breaching operations. You then forward a Blue 1 (spot report) to the S3 and receive the following order:

> "The obstacle must be bypassed or neutralized within 45 minutes. The OPCON engineer platoon has not shown yet. If you cannot bypass or breach obstacle, notify me immediately, out."

Alpha section reports "Set" and you then order Bravo to move forward, locate a bypass on the eastern side and set up forward security. As Bravo section is moving, they come under fire from a Sagger missile and small arms.

"Red 1, this is Red 5, contact, Sagger and machine gun, northeast"

Bravo section immediately deploys, returns fire, and attempts to develop the situation. You immediately order Bravo to call for indirect fire support and order Alpha to maneuver to the flank of the enemy to assist in developing the situation. You then forward a contact report to the S3 and receive the following order:

"Send me a detailed spot report. You have priority of fire. Destroy enemy if possible. Don't forget the obstacle. Keep me posted, out!"

After approximately five minutes, Alpha section reports visual contact and sends the following Blue report:

"Red 1, this is Red 2, Blue 1 follows:
(S) 2 BMPs w/dismounts.
(A) Stationary in treeline.
(L) Grid SN467829
(U) Forward security element.
(T) Time 0427
(E) Equipment not visible.
West flank will support a hasty attack."

Before you can reply, artillery starts to land and Bravo section sends you the following:

"Red 1, this is Red 5, Blue 2 (situation report), the BMPs are delaying north at a high rate of speed, last seen grid SN468833, request permission to maintain contact, over."

WHAT WOULD YOU DO?

For 25 years, from 1950 to 1975, one of the most popular features in ARMOR was "What Would You Do?", a series of tactical problems concluding with a "school solution." In light of reader survey interest, this feature will again be a regular part of ARMOR Magazine. -Ed.

As the platoon leader, you are faced with the following: You have been given the order to breach the obstacle, however, you have the inherent responsibility to maintain contact. What are your actions?

Discussion

Do you pursue the enemy or do you take the time to breach the obstacle so that the battalion can move freely and uninterrupted? You do not have the assets to do both. If you were to try to maintain contact with the enemy, plus leave a force to breach the obstacle, your platoon would be stretched beyond its capabilities. The importance placed on the obstacle by the S3, and the fact that he wants it neutralized within 45 minutes, should tell you that it's probably in the path of the main force and the lead unit will arrive at the obstacle within that time frame. In view of OPSEC requirements, the S3 will not tell you this information over the

"Once the security reports 'Set', you move the platoon sergeant with his crew to the obstacle."

radio unless you both have secure capability. At this point, your primary concern should be the obstacle. Bravo section, which has visual contact with the enemy, should continue to adjust fire to destroy him or impede his delay. But how do you breach this obstacle while maintaining the appropriate security measures in enemy territory with no engineer squad, and only a six-vehicle platoon?

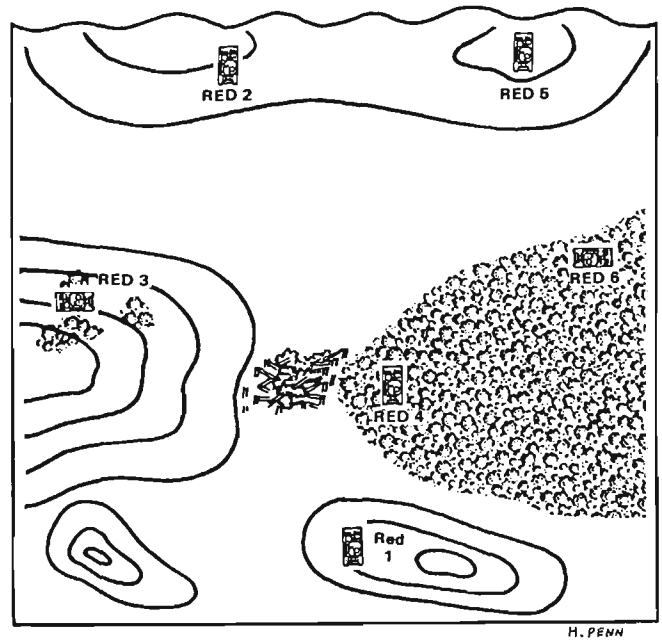
First, you position yourself and the platoon sergeant (Charlie section) so that you can both observe the obstacle and the dominant terrain that surrounds it. Once your section is set, move Bravo section as far forward as METT-T will allow for early warning and security. Bravo must also locate a bypass in case the obstacle cannot be breached. (Alpha is already set and has located a bypass on the western side).

Once Bravo is set, you have the section leaders send the other squads within their sections back to the obstacle. They will be at MOPP Level III and have the bypass reports with them. The squad leaders will stop short of the obstacle, dismount everyone except the gunner and the driver, who will then move the Bradleys to the flanks of the obstacle as far as the terrain will allow to provide additional limited security for the clearing party. The Bradleys must be far enough to the flanks to provide good overwatch and reaction time should the enemy attack from the flanks. Meanwhile, the dismounts will establish 360-degree local security.

During this type of operation, it's very easy to lose command and control of your platoon. You must be acutely aware of this and take the necessary precautions to preclude this from happening.

Once the security reports "Set", you move the platoon sergeant with his crew (also in MOPP III) to the obstacle. The platoon sergeant will stop short of the obstacle, dismount with his crew, recon, and attempt to clear the obstacle. If necessary, he can select personnel from the local security force to assist with the clearing operation. You are responsible for rear security, overwatch, and keeping the commander posted on the obstacle and any changing situations.

Once the obstacle is cleared, the Bradleys providing flank security will return to the obstacle, pick up the crews and rejoin their section. The platoon sergeant will move through the site and set on the far side. You will report to the S3 (or commander) that the obstacle has been breached, join the platoon sergeant, and continue the hasty zone reconnaissance to PL Eagle. You must keep in mind that time is critical. Some of these actions may have to be performed simultaneously to increase speed. However, risk also increases, and you sacrifice some degree of security.



If during the platoon sergeant's reconnaissance of the obstacle, he determines that the obstacle cannot be breached, or that breaching operations will be too time-consuming, he would immediately return to the platoon leader's location with the bypass reports. The platoon leader would immediately notify the S3 and forward the bypass reports by radio or messenger to the leading unit or command CP as directed by the S3 or commander.

The intent of this article is to illustrate how a scout platoon would reconnoiter and clear an obstacle. When the scout platoon is maneuvering in front of a larger force, it will normally not have the time to conduct a breaching operation. The platoon will locate a bypass and forward its location to higher headquarters. As the eyes and ears of the main force commander, the platoon must stay well forward and continue to provide information on the terrain and enemy. However, there will be occasions when an obstacle must be reconnoitered and cleared, and the only asset available to the main force commander is the scout platoon. The obstacle can be in the form of an abatis, bridge, chokepoint, or any other obstruction that can impede movement. It is of utmost importance that the scout platoon be able to conduct this mission to avoid wasting critical time.

This tactical problem was developed by CPT Toby W. Martinez, CPT Paul C. Jussel, and SSG Jerry D. Johnson of the Platoon Tactics Division, Cavalry Branch, Command and Staff Department, Fort Knox, KY. Illustrations were prepared by Henry Penn of the Command and Staff Department's Training Development Support Division.

Inherent M1 Decon Capabilities

by Captain Judd E. Squitier

Among many of the critical considerations for success on the mechanized battlefield is NBC decontamination. These considerations and concerns in the NBC area are based on our own limited combat assets, limited NBC decontamination assets, and the well-developed NBC doctrine of the Warsaw Pact nations which possess NBC equipment in great quantities. For example, on a 1983 CAMMS, division-level computer simulation conducted within the 3d Infantry Division, NBC decontamination became a concern for commanders at all levels.

The Army of Excellence (AOE) Heavy Division organization currently has a decontamination company at division level. The squads of this unit are habitually sent out to provide support to a brigade. This squad has limited capabilities, and within a brigade sector a typical decontamination site quickly becomes overcrowded with units attempting decontamination. As a result of the "traffic jam" at a typical site, an armor or mecha nized platoon could expect to spend 6-12 hours in waiting and execution of a complete decontamination. The large volume of units conducting decontamination will also present unique logistical and resupply problems for the chemical units themselves. Ideally, using the M12 decon apparatus, a decontamination squad can decontaminate four vehicles and associated personnel in one hour. For larger volume, the formula is "total number of vehicles divided by four plus one hour." The SANATOR apparatus, with its 30-50 personnel-per-hour capacity is entering the supply system and will enhance our capabilities. Again, however, from computer simulations and even ARTEP scenarios, we regularly find that decontamination is a slow process which can keep combat power out of the fight.

FIGURE 2. "Cannon Device" uses M1 turbine exhaust for decontamination.

This article describes some unit initiatives which can be applied at platoon and company level to enhance decon capabilities. Some innovations which have already been successful at company level will be illustrated, and other devices for future construction will be discussed. These center on the M1 tank's potential and capabilities as a major decontamination apparatus. These capabilities involve in-

FIGURE 1. Russians have long used truck-mounted jet engines to decontaminate tanks, car-wash style.

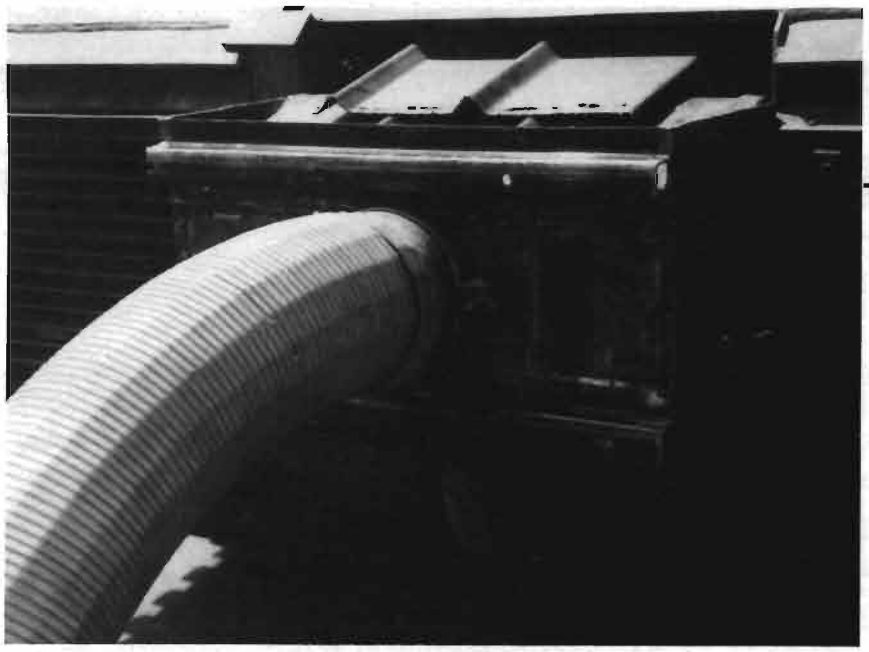


FIGURE 3. Closeup shows how Cannon Device is mounted on M1 grille.

FIGURE 4. 55-gallon drum mounted on tank deck feeds decon solution to smoke generator.

"The M1 tank does give a unit some of its own organic decon capabilities...."

FIGURE 5. Drum-based scrub device is attached by hose to brush assembly.

herent characteristics of the tank, such as turbine-engine-produced heat and thrust, as well as the engine smoke generator system.

The Soviets already have a successful turbine decon system in the TMS65. It is a truck-mounted jet engine which introduces a decontamination solution into the high temperature exhaust and thrust of the turbine. (See Figure l). A fog results, which decontaminates 20-30 vehicles per hour using a carwash technique. Two inventions created within the 2d Battalion, 64th Armor, 3d Infantry Division, have genuine General Defense Plan applications and work on the same principle as the TMS65.

The Cannon Decon Apparatus (see Figure 2) was invented by First Sergeant George N. Cannon, formerly of this unit and currently assigned to the 24th Infantry Division. It is a flexible, large diameter maintenance shop exhaust pipe which has been affixed to the rear grille of the Ml (see Figure 3). The Ml produces approximately 950 degrees F at the rear of the vehicle. When the engine is placed in tactical idle, the RPMs increase and the temperature increases up to approximately 1350 degrees F. The Cannon device allows this extreme heat to be directed at any part of a contaminated vehicle, to include the turret and the top of the turret. It was successful in destroying persistent type chemicals in tests conducted at unit level.

Another device, invented by the author, uses a fluid solution. A 55-gallon drum assembly with pump and feeder system was hooked directly into the disconnected smoke generator system. A decontamination solution was then pumped from the drum into the splatter plate of the Ml's smoke generator system in place of the diesel which ordinarily creates the tank's screening smoke (see Figure 4). This technique has some drawbacks and is still being developed. DS2 cannot be used as a decon solution, due to its explosive nature. A solution with an STB consistency produced a small smoke cloud for potential carwash style decontamination.

There is a potential flashpoint problem with actual STB, however, and a hybrid system is being worked out which combines this system with the Cannon system.

The weakness of the Cannon system is the small concentrated area limitations of the device. Introducing the fluid several feet from the rear grille of the tank into the flexible tube of the Cannon system may produce a more desirable effect. While this technique is still on the drawing board, the 55-gallon drum apparatus can be used as an effective scrub device.

The device is the same as the one mounted on the rear deck of the tank, except that a brush assembly and lengthened hose are added where the hose ordinarily couples into the smoke generator system (see Figure 5). The same small tank fuel pump powers the unit. There is a grounding wire and a power wire which can be hooked to tank or truck batteries.

A working unit SOP for platoon-level decontamination has been developed in the author's unit which uses the brush and drum assembly along with the M1's turbine. It has been field tested. Using a unit OPTERM, the platoon leader requests decontamination assistance. The company trains are notified, and the first sergeant sends the supply truck, with the NBC NCO and decon apparatus, forward to the platoon's location or an LRP. The platoon's personnel (2 per tank) dismount through turret hatches using their basic load M11s to decon the turret top and front slope as they dismount. One tank at a time is pulled up to the supply truck, as in a filling station operation. The 55-gallon drum with pump and scrubber is then used to provide a thorough turret decon.

The tanks then move into a car-wash configuration (see Figure 6). Set at approximately 45-degree angles, one section, in tactical idle, provides intense heat as the other section moves slowly through. The section moving through first then leap-frogs forward and sets up for the other section. Thus, an effective decon of the turret ring and below is achieved which, coupled with the turret scrub gives a good hasty, if not complete, decontamination. A well-drilled platoon completes this cycle in MOPP IV in less than one hour, and there is solution left over.

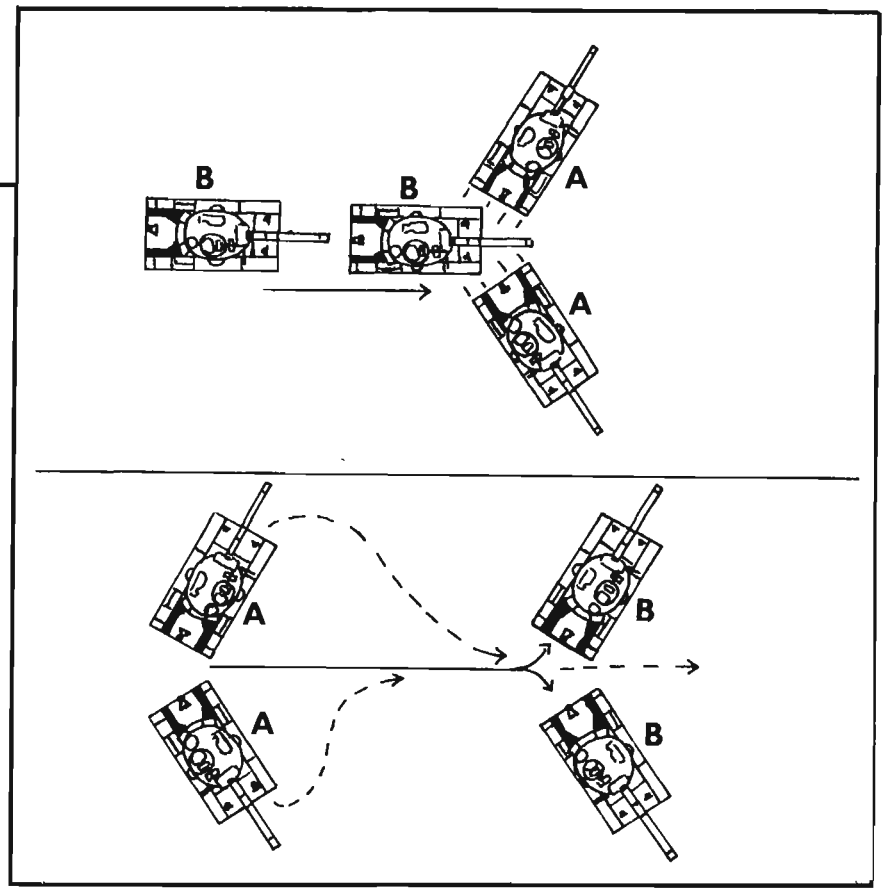


FIGURE 6. Schematic shows arrangement of a "car-wash" style decontamination setup. One section's engines provide heat while the other section moves through.

We also must remember that, as in all decon operations, the vehicles must be prepared for decontamination. For example, before subjecting the outside of the tank to the extremely high temperatures of the M1's exhaust, crews should ensure that they remove all flammable equipment (TA-50, etc.). Additionally, if a unit plans to use the M1 exhaust as a decon technique, the unit may want to reexamine external load plans to ensure that equipment easily damaged by high temperatures is repositioned.

The M1 tank does give a unit some of its own organic decon capabilities which will supplement major NBC decon devices. As we await further development and procurement of state-of-the-art equipment, especially under the future "S" TOE, we must continue to develop these field-expedient techniques.

CAPTAIN JUDD E. SQUITIER was commissioned as a Distinguished Military Graduate from Syracuse University in 1977. His staff experience in CONUS AND USAREUR includes assignments as an S3, S4 and two assignments as an S1. He has served as a tank platoon leader as well as on the M-1 Full Scale Engineering and Development test. An AOAC graduate, he currently commands D Company, 2-64 Armor in the FRG. He is a past contributor to Armor Magazine.

Cavalry in the AirLand Battle

> *"I have travelled a heap of late, and had occasion to retire into some very sequestered regions, but nary hill or holler, nary mountain gorge or inaccessible ravine, have I found but what the cavalry has been there, and 'just left.' And that is the reason they can't be whipped, for they always 'just left,' and took a horse or two with 'em."*
>
> *—Bill Arp*
> *Confederate Humorist*

Mention the word *cavalry* around any group of combined-arms fighters today and it conjures up an image like this or something less complimentary. If you asked this same group what the role of cavalry is in our doctrine of AirLand Battle, you'd get a variety of opinions. Some would say that cavalry performs reconnaissance and screening tasks for units to which assigned or attached. Others would say it does that and additional security tasks, guard and cover, plus defend, delay, and attack in an economy-of-force role. Moreover, even if our combined arms warriors did agree on the missions, few will agree as to the organizations required to accomplish those battlefield tasks. But one thing is certain. There will be no concensus on cavalry roles, missions, or structure. And that's not good because it means we don't have a doctrine — a shared understanding — of what cavalry is organized and equipped to do for the combined arms team, nor of the concepts for its employment at the operational and tactical levels of war. This article is the first of a series of three intended to describe the fundamental role of cavalry in AirLand Battle and to articulate doctrine for the employment of cavalry, *both ground and air,* in the corps and division.

The Fundamental Role of Cavalry

In addition to reviving an awareness of the Principles of War and restoring an offensive spirit to the character of our Army, AirLand Battle Doctrine has embraced a couple of combat fundamentals about fighting and winning. First, the force which seizes and sustains the initiative, and exercises it aggressively to defeat the enemy, will win. Second, decisive combat power concentrated at the right time and place will decide the outcome of battle. Maneuver — fast, continual, and synchronized with other elements of the combined arms team — is the essence of our doctrine. Our intent is continually to keep our enemy off balance by delivering a series of blows from unexpected directions — the essence of maneuver warfare. From these tenets of our doctrine stem the requirements for cavalry. Cavalry serves as a catalyst to translate those doctrinal tenets into battlefield capabilities. *Cavalry, by providing current combat information, facilitates a commander's ability to seize and sustain the initiative and concentrate overwhelming combat power against the enemy at the decisive place and time.*

Provide Current Combat Information

The ability of a commander to seize and sustain the initiative and concentrate superior combat power at the right time and place is predicated on having fresh information about the enemy — his exact disposition, size, composition, direction of movement, and rate of advance. A commander must also have current information about terrain features and trafficability within his area of operations. These factors, more than any other, influence his ability to maneuver ground forces to the point of decision. Commanders court disaster without this kind of combat information. It is not easy to acquire. To piece the puzzle together, corps and division commanders have a variety of sources of intelligence at their disposal — military intelligence organizations, long-range surveillance units, artillery target acquisition systems, air defense warning systems, Air Force and Army air reconnaissance/surveillance systems and national technical means. Collection efforts are focused well forward of the FLOT in an attempt to predict most probable enemy responses to our initiatives. These predictions must be projected ahead far enough in time to be consistent with the time necessary to plan and execute corps and division operations. This intelligence information is used primarily to support *planning* of further operations. It serves as a basis to dispose and concentrate forces to achieve operational objectives.

While this type of intelligence information is necessary for success, it is not sufficient. The commander needs fresh combat information during *execution* to be precise in his maneuvers. Precise application of combat power is predicated on having *current* information about the enemy and terrain. A commander's cavalry unit remains his primary source of fresh information that he can use for the rapid execution of maneuvers and fire support in response to the *immediate* combat situation. Performing reconnaissance, cavalry tells a commander what he needs to know to fight — the actual size and composition of the enemy, his exact disposition, where he's strong, where he's weak, and where the application of superior combat power could have a decisive effect. Cavalry shows a commander how to move his ground forces to objectives despite conditions on the battlefield which conspire to defeat him — battlefield debris, impassable routes, blown bridges, unfordable streams and rivers, contaminated areas, refugee columns, converging friendly forces — and enemy.

Preserve Combat Power

Cavalry also performs missions which protect and preserve the combat power of divisions and corps until commanders determine where forces need to be concentrated and until forces can be maneuvered into engagements with the enemy. When fighting a bigger, echeloned, enemy, sustainment and preservation of combat power is critical. Just winning the current battle isn't good enough. We must minimize losses. In defensive operations, cavalry provides early warning of enemy approach and counters enemy ground reconnaissance ven-

tures, effectively screening its parent unit from enemy observation. Operating at a distance from the main body, cavalry develops the situation, preventing its parent unit from fighting at a disadvantage — unwarned, poorly deployed, not poised to fight. In the process, cavalry affords the commander an opportunity to seize the initiative. In offensive operations, well in advance of its parent unit, cavalry prevents the premature deployment and attrition of its parent unit until it reaches its objective, due to the influences of terrain or enemy forces.

Time and Space

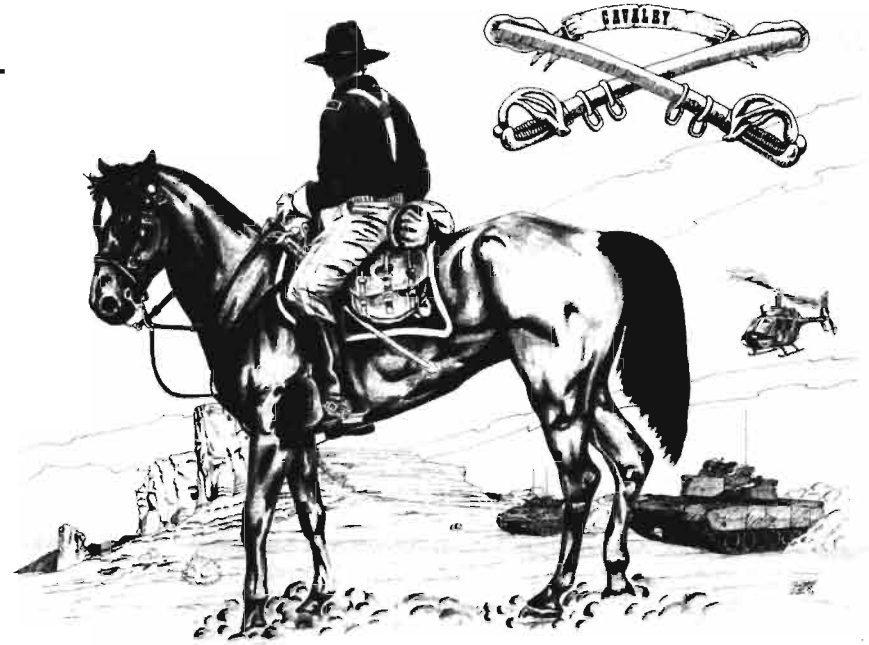
Corps and division commanders need time and space to exploit local tactical success into operational victories — *time* to solve the puzzle, decide what to do about it, and concentrate superior combat power at the point of decision and *space* to maneuver large ground forces, retain flexibility, and absorb the momentum of the enemy's operations. Performing reconnaissance and security missions at considerable distances from its parent unit, cavalry provides commanders time and knowledge of available space for effective synchronization of maneuvers, supporting fires, and logistical support.

Economy of Force

We are fighting a bigger opponent. Outnumbered in the macro, we must be decisively stronger in the micro at the critical point. The only way to do this is to accept risk. This is fundamental to our doctrine. There will always be a need for economy of force by somebody, maybe cavalry. Organized as a combined arms team, cavalry provides a commander an economy-of-force option to free other combat maneuver units for employment elsewhere within the area of operations.

Restoration of Command and Control

On a battlefield that's fluid and chaotic, with communications frequently lost or jammed, command and control within corps and divisions is fragile. Loss of communications with subordinate units, gaps, and dead spaces within the area of operations are conditions



very likely to occur. Cavalry is particularly suited to meet this battlefield challenge. Performing reconnaissance, cavalry finds and retablishes physical contact and communications with subordinate units, fills dead spaces to restore the continuity of defensive operations, and fills gaps to prevent exploitation by the enemy if detected.

Disruption of Operational Plans

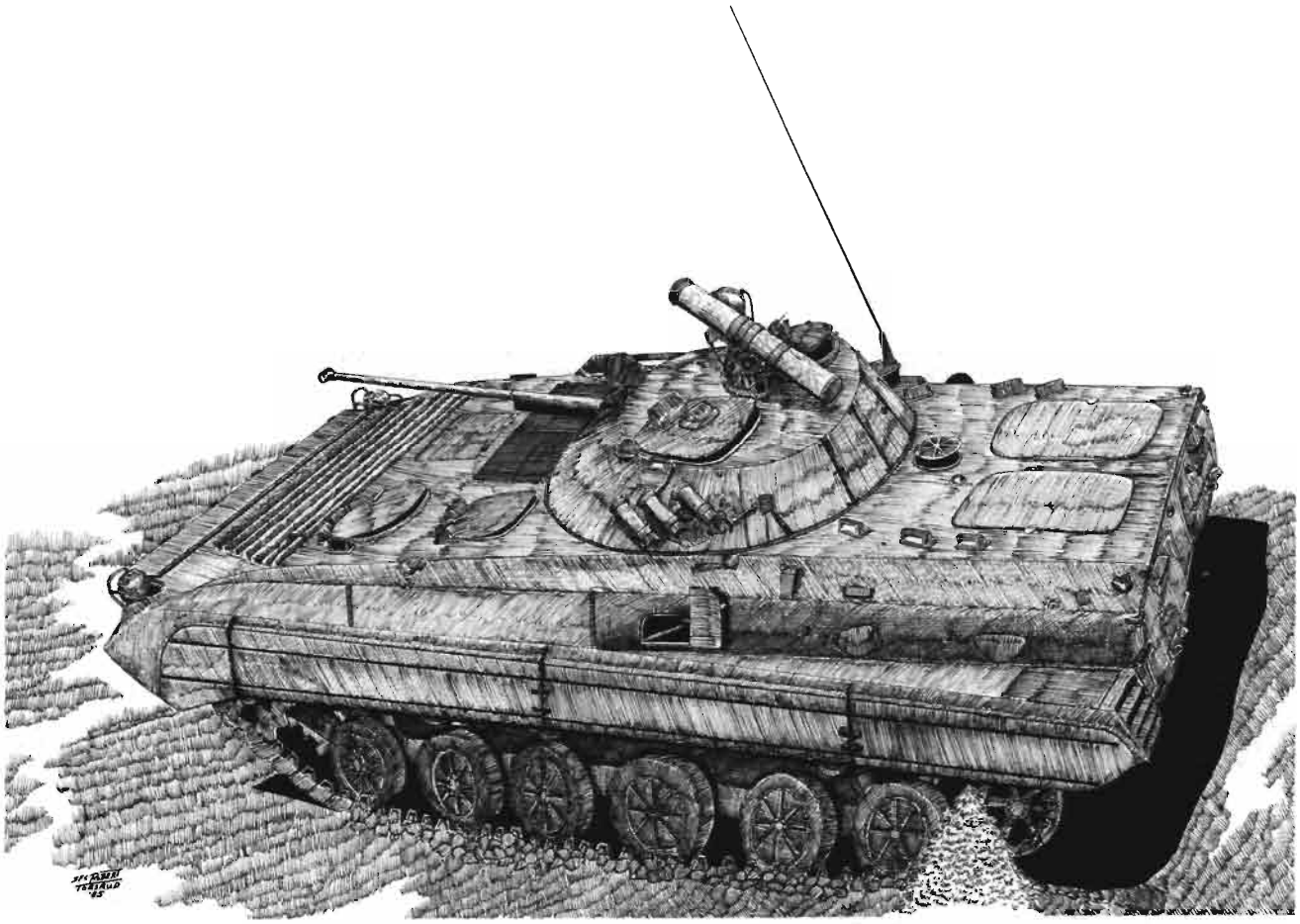
There is a decisive benefit to disrupting the operational plan of the enemy. The Soviets are rational players who construct top-down scientifically-based, highly-detailed plans. Any disruption in the execution of their plan will break the *tempo* of their operation and provide an opportunity for us to seize the initiative. Deception at tactical and operational levels is a key element of the disruption effort. Cavalry is a central player in deception operations. Cavalry can portray a false combat operation to deceive the enemy and his target acquisition systems or create the signature of a much larger unit. In its counter-reconnaissance role, cavalry can *deny* the enemy accurate combat information about our tactical and operational intentions.

Cavalry Today

Several of the roles and missions which cavalry performs today are traditional. Others have evolved to satisfy the requirements of our operational concepts and AirLand Battle doctrine. Others have evolved in response to changes in our enemy's doctrine and operational art. Cavalry is a versatile, combined-arms maneuver force which increases a commander's options. It facilitates his ability to seize or sustain the initiative, achieve depth, retain agility, and synchronize maneuvers, supporting fires, and logistical support. Cavalry facilitates the commander's ability to preserve, and then concentrate, overwhelming combat power with *precision* where it will decide the battle or campaign.

We have set the stage for a more detailed discussion of cavalry operations by establishing the doctrinal framework. The roles, missions, and organization of cavalry at corps level — namely the armored cavalry regiment — will be examined in the next article. Scouts out!

This article, which reflects current doctrine, was prepared by the Cavalry Branch, Command and Staff Department of the Armor School. The article was written by Major John D. Rosenberger and Colonel Thomas E. White of the Combined Arms Center.



New Soviet BMP-2 Unveiled

(Ed. Note: Information for this article was derived from DEFENCE UPDATE INTERNATIONAL, No. 64, and Threat Branch, DCD, Fort Knox, KY.)

Faced with the combat inadequacies of their BMP-1 armored personnel carrier in the Yom Kippur War of 1973, and later in Afghanistan, the Soviets have produced a new model — the BMP-2. There has been a change in the main armament; the turret has been relocated, and the infrared (IR) and other optical equipment is different. Additionally, the new vehicle carries fewer infantrymen.

The BMP-2 is in service in Afghanistan and has been photographed there as well as at a recent May Day parade in Moscow.

The BMP-1 was highly vulnerable to fire from heavy infantry weapons, medium antiarmor weapons, and artillery fire. Its main gun, the 73-mm 2A20 low-pressure smoothbore firing the PG-9 fin-stabilized projectile, proved ineffective due to the limited range of the round and its vulnerability to winds while in flight.

Moreover, the gun's semiautomatic loading system not only slowed the rate-of-fire, but also jammed frequently. And because the gun automatically moved to 3.5 degree elevation after firing, the gunner's sight was moved off-target. The gun had a theoretical rate-of-fire of four rounds per minute, but this was rarely, if ever, achieved in combat. The gun's limited range of elevation and depression — from -3 degrees to +33 degrees — was another disadvantage. The BMP-1's coaxial 7.62-mm machine gun was similarly limited in elevation and depression.

The BMP-1 also carried the AT-3 Sagger missile, fired from a launch rail over the main gun. Reloading the missile launcher entailed nearly complete exposure for the gunner. To track the missile in flight, he had to keep the sight's crosshairs on the target with his right-hand joystick and traverse the turret with his left hand.

While the new BMP-2's main gun is of smaller caliber than the 73-mm of the BMP-1, it is a more efficient weapon. It is a 30-mm rapid-fire cannon stabilized in two planes. It has a dual-feed system for AP-T or HE-T ammunition. It has three firing modes: single-shot or two rates of autofire — 200-300 rounds per minute or full auto at 500 rounds per minute. The 30-mm AP-T shot can penetrate, at zero degrees angle of obliquity, 55 mm of armor at 500 meters and 50 mm at 1,000 meters. Five hundred rounds of main gun ammunition are carried, as are 2,000 rounds of 7.62-mm ammunition for the coaxial machine gun.

The BMP-2's square mantlet, as opposed to the BMP-1's protruding mantlet, allows the gunner to elevate the gun to a maximum of 74 degrees, which gives it excellent antiaircraft (AA) capabilities, especially against low-flying planes

"...The human engineering is virtually unchanged..."

and helicopters. The 30-mm gun's maximum effective AA range is 2,000 meters.

The AT-3 Sagger antitank guided missile (ATGM) of the BMP-1 has been replaced on the BMP-2 by the AT-5 Spandrel ATGM. This newer missile has a range of 4,000 meters and a semi-automatic guidance system. The gunner fires the Spandrel from its over-the-turret launching rail. The special guidance optical equipment for the Spandrel sets just below the launcher. The crew can reload the missile launcher from inside the turret. The BMP-2 carries one Spandrel ATGM in the ready position on the launch rail and four more inside the vehicle. Some sources also report that the BMP-2 is alternately armed with the AT-4 Spigot ATGM that has a range of only 2,000 meters.

There are three grenade-launcher pods on either side of the turret, capable of firing HE or smoke grenades. Similar pods have been seen on the newest T-72/80 tanks. In addition to the smoke grenades, the Soviets also inject diesel fuel into the exhaust system to produce smoke.

The most noticeable visible feature of the new BMP-2 is that the turret is further back, compared to the BMP-1. The BMP-2 turret ring is two meters in diameter, about one-half a meter larger than the ring on the BMP-1. The commander sits on the gunner's right and has a large revolving overhead hatch. Both the commander and the gunner have three integrated periscopes. The BMP-2's radio antennae are behind and to the right of the turret.

The third crew member, the driver, sits forward in the hull. In the BMP-1, the commander sat up front behind the driver, and we know that many BMP-1 commanders used the gunner's seat instead, despite the consequent problems in the turret.

The hull-mounted IR searchlight on the BMP-1 has been moved to the BMP-2's turret hatch, and a new white-light and IR gunner's sight are mounted to the right of the main gun and slaved to it.

Comparison of this photo of the BMP-1 with the drawing of the BMP-2, opposite page, indicates changes in rear deck hatches and reflects reduction in infantrymen carried inside the new model.

There do not seem to be any thermal sights on the BMP-2.

Armor on the BMP-2 offers the same protection as the BMP-1. Maximum hull armor thickness is 19-mm and that of the turret is 23-mm. The BMP-2 is proof against .50 caliber all around and against 7.62-mm from above.

The BMP-2 has only two hatches, whereas the BMP-1 had four. The BMP-2's hatches are directly above the rear doors. These doors also serve as fuel cells, as on the BMP-1.

Moving the BMP-2's turret further to the rear has reduced the number of infantrymen the vehicle can carry. The BMP-1 could carry eight, but the BMP-2 can only carry six. Theoretically, the infantrymen can fire their weapons through hull ports just beneath the turret ring. In practice, however, this hasn't worked because of the crowded interior. The vehicle's poor ventilation system can't handle the high concentrations of cordite gases. This is known to have happened repeatedly in the BMP-1 during the Mideast wars.

Another identification point on the BMP-2 is the addition of a third shock absorber to the second forward pair.

The new vehicle weighs in at 14.3 tons and is 6.858 meters long. It stands 2.077 meters high to the top of its turret and can travel up to 80 km/hr on roads. It has a road range of 450-500 km and can cross a trench two meters wide.

An onboard fire extinguishing system is provided as well as a gyrocompass and an antiflooding system for the engine during amphibious operations. Also an exterior optical-cleaning device is fitted.

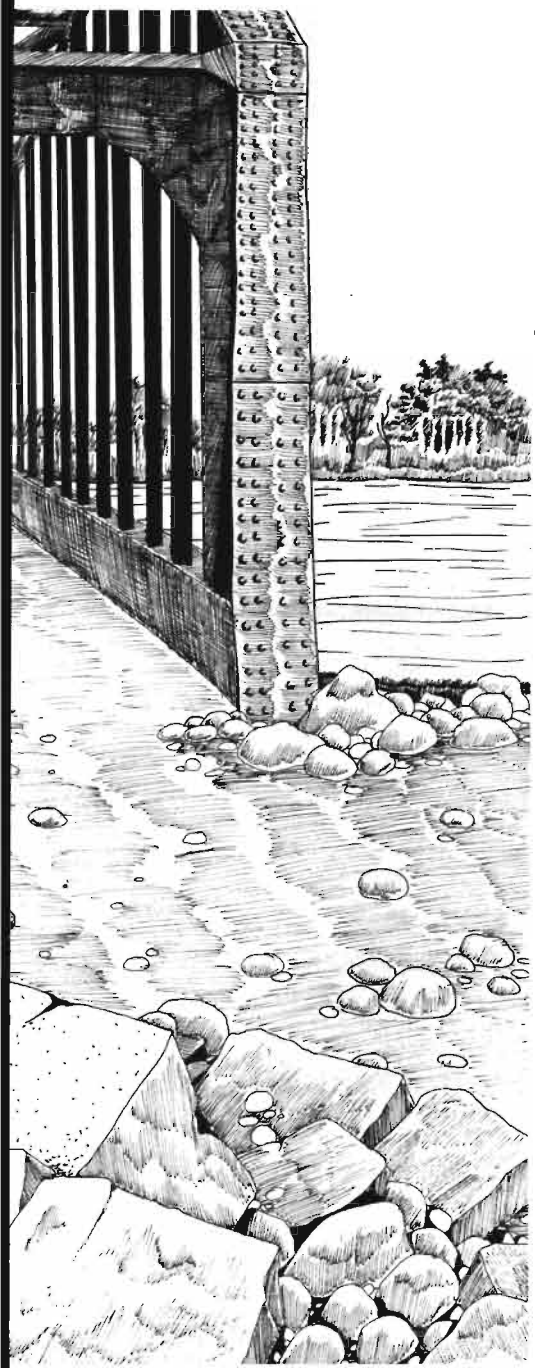
Although the BMP-2's firepower has been upgraded with its 30-mm rapid-fire cannon and the new Spandrel ATGM, the human engineering is virtually unchanged. The vehicle's survivability on the battlefield does not seem to have been significantly improved over its predecessor and like the BMP-1, the BMP-2 is still highly vulnerable to mines.

The Defense of the Vienna Bridgehead

by First Lieutenant Peter R. Mansoor

Armored warfare can be viewed on many levels, but in the final analysis, it is the individual vehicle crews who decide the outcome of battles. The following is an account of a battle fought within a month of Germany's surrender. It is remarkable for two reasons. The fact that Germany could still field forces capable of defeating a numerically superior enemy at this stage in the war is one aspect of the story. More fascinating, by far, is the impact that one tank and its crew could have on the outcome of a crucial battle for a key piece of terrain. It is an engagement worth studying for the lessons it still offers to modern day military professionals of the armor force.

By early April 1945, Soviet armies were poised on the eastern edge of Germany's heartland. The *Wehrmacht* put up stiff resistance where it still had enough strength left to do so, but the overwhelming materiel might of the Russian armies and air forces was making an effective defense of the remnants of the Third Reich increasingly dif-



"...In the final analysis, it is the vehicle crews who decide the outcome of battles..."

ficult. Some German units, however, were able to fight and win classic delaying actions against the invading Soviet forces. One such action was fought in the city of Vienna in the second week of April, 1945.

By the 12th of April, only one bridge over the Danube River was left standing in the vicinity of the city (see map, page 31). This was the Floridsdorf Bridge, located in the 21st District of Vienna. Elements of the *Der Fuehrer* and the *Schutz Staffel Deutschland Panzergrenadier* Regiments of the 2nd SS *Panzer* Division (*Das Reich*), perhaps two battalions in total, were still in possession of approximately one to two kilometers of Vienna on the southern side of the Floridsdorf Bridge. They were supported by a handful of tanks from the *Das Reich Panzer* Regiment. Attacked incessantly by the Russian forces and harried by urban guerillas friendly to the Soviets, the German forces fought stubbornly to buy time for their comrades setting up a defense on the northern bank of the Danube.

The German infantry fought in three dimensions. Underground, the citizens of Vienna had broken passageways through the walls in their basements so that the city could be connected during air raids. The German infantry used this underground network extensively. The Soviets could control the street level for two blocks behind the German infantry who still controlled the basements. The same situation applied to the upper levels of the buildings. It was street fighting at its worst. The situation, put simply by one German who fought there, was "a mess."

Most of the German armor had been withdrawn from Vienna when the street fighting began. The Germans had learned the grim truth at Stalingrad that armor was severely handicapped in city fighting. Not only that, but should the Floridsdorf Bridge be destroyed, the German armor would be effectively trapped on the southern bank of the Danube. As it was, movement across the Floridsdorf Bridge was extremely difficult, as the Russian forces had it covered with both direct and indirect fire. The Soviets wanted to take the bridge intact to aid their advance. The Germans wanted to use it to buy time for an effective defense to be established behind the Danube and then to blow the bridge when the Soviets finally took it. To this end, the bridge was completely wired for demolition.

The *panzers* of the *Das Reich Panzer* Regiment were established in laagers in the vicinity of Stammersdorf, approximately five kilometers north of the Floridsdorf Bridge. The tank crews had camouflaged their positions well, but more due to the habits acquired on the Western Front, where the allied air forces reigned supreme during the day, than to any fear of the incompetent ground attack pilots of the Russian Air Force. The common joke in the 2nd *SS Panzer* Division was that when the Russian Air Force made a bombing attack, the safest place to be was on the target.

Early in the afternoon on 12 April, the regimental commander of the *Das Reich Panzer* Regiment, *Standartenfeuhrer* (Colonel) Enselin, called together all the tank crews whose vehicles were in the vicinity of the regimental headquarters in Stammersdorf. One such crew was that of tank number 1227. The crew had been together since the Battle of the Bulge, and was seasoned and experienced. The tank commander, *Obersturmfeuhrer* (First Lieutenant) Arno Giesen, was also the platoon leader of his Panther tank platoon. He had been with the 2nd *SS Panzer* Division since 1943, and had fought at Kursk, Normandy, the Bulge, and in the Hungarian Offensive of early 1945. He had, to date, 97 tank kills to his credit.

Giesen was 19 years old.

His gunner, *Unterscharfeuhrer* (Sergeant) Gert Ehegotz, had been with the unit since 1943 and was a superb and experienced tanker. Ehegotz was 23 years old. The driver, *Unterscharfeuhrer* Alwin Sternath, had been driving tanks in the 2nd *SS Panzer* Division since 1941, and was a master mechanic. At 44, he was one of the oldest men in the regiment, and was a personal friend of the regimental commander. He was like a father to the younger members of the crew, calling them all, even Giesen, by their

"...Barkman was one of the most successful tank commanders of the war, with 82 tank kills to his credit..."

nicknames. The loader, *Rottenfeuhrer* (Corporal) Fritz Sprieg, and the radioman, *Unterscharfeuhrer* Guenter Rau, were both seasoned combat veterans, and knew their jobs well. Sprieg and Rau were 19 and 20, respectively. The crew sat intently listening to what the regimental commander had to tell them.

The regimental commander had to scream to the assembled men because 300 meters away a battery of *Hummels,* 155-mm self-propelled artillery pieces, were hammering away at the Russian positions. The situation on the other side of the Floridsdorf Bridge, he told them, was critical. The tanks supporting the infantry had nearly run out of ammunition. No trucks could get across the bridge due to the intense fire directed at it. A tank would have to cross the bridge with ammunition onboard to resupply the crews on the southern bank. Enselin asked for volunteers. The men were silent, for they knew it was a suicide mission. Enselin scowled, reminding them that their's was an *SS* unit and there would be volunteers. Everyone looked at each other. Finally, Sternauth nudged Giesen, saying, "Bubie, (i.e., "baby"), we're going," and raised his hand.

Enselin saw the hand of his friend and laughed, remarking, "I knew I wouldn't have to make this the first time I had to volunteer someone for a dangerous mission."

The crew of 1227 worked hard that afternoon preparing for the mission. The Panther was loaded with 92 rounds of 75-mm main gun ammunition, ten cases of machine gun ammunition, five insulated containers of hot food, and cigarettes and two bottles of cognac for good measure. In addition, it would pull an ammunition trailer containing an additional 50 rounds of main gun ammunition. Late in the afternoon, everything was ready. Giesen shook hands with Enselin and drove off towards the Danube.

Around 1700, Giesen reached the bridge and directed his tank into a covered and concealed position. Sternauth and Giesen dismounted to make a leader's reconnaissance of the bridge. On the friendly side of the bridge was a battery of 88-mm antitank guns, commanded by *Oberleutnant* (First Lieutenant) Struwe, a *Luftwaffe* officer. Struwe informed Giesen that there was a bomb crater in the middle of the bridge, making vehicular traffic hazardous at best. Giesen and Sternauth looked at the bridge through binoculars. Struwe asked them what they were going to do. When Giesen told him, Struwe looked incredulous. "Not for a million marks would I drive across that bridge," Struwe gasped. "Only the *Waffen SS* could be so crazy!"

Giesen's plan was to drive across the bridge at full speed under the cover of darkness. Since the Panther had seven forward gears, it would be necessary to start the tank's run at the bridge from two kilometers away. Under total blackout, this ride could well have been the crew's last. The driver had to memorize every foot of the bridge and, from memory, swerve at exactly the right moment to avoid the crater and the dark Danube below. Giesen and Sternauth watched the bridge until it got dark, and then returned to their vehicle.

Giesen directed his vehicle back along the road until it had plenty of running room. Struwe cleared the road. Giesen called the regimental headquarters and asked for artillery on the Kahlenburg, a known Russian artillery position, and for direct and indirect fire to be directed at the Russian positions on the southern bank. Enselin grabbed the radio mike. "Don't ever think that we placed your head on a chopping block," Enselin said. "Whatever we can do for you, by God, it will be done!"

The regimental commander kept his word. As Giesen started his run at the bridge, German *Hummels* and *Wespes* (105-mm self-propelled artillery guns) hammered at the Kahlenburg and German units deployed on the northern bank fired away at their Soviet counterparts. The Panther got up to speed. As it passed Struwe, he rendered to Giesen a hand salute. Giesen smiled. He was more afraid of falling into the Danube than of being hit by Russian fire.

Sternauth was the oldest and most experienced driver in the regiment, and that night he proved that he was also the best. Small arms fire ricocheted off the turret, but Sternauth drove the Panther safely to the southern side of the bridge. As soon as the tank drove off the bridge into the open plaza, however, all hell broke loose. A barrage of Russian artillery raked the area. Rounds impacted as close as 20 meters to the tank. The crew hustled the Panther into a side street where a scout directed it into position in the front line. Geisen exhaled deeply.

The front line was quiet. Down the street was another Panther tank of the *Das Reich,* commanded by *Oberscharfeuhrer* (Sergeant First Class) Barkman. Giesen had never met Barkman, but he had heard of him. Barkman was one of the most successful tank commanders of the war, with 82 tank kills to his credit. He had fought in France, Russia, and the Western Front, and had been decorated with the Knight's Cross. Giesen moved his Panther behind Barkman's and dropped the ammunition trailer. Barkman's crew worked frantically to reload. They had been fighting constantly for several days and were down to five rounds of main gun ammunition. They also ate heartily from the rations which Giesen had carried over the bridge.

Giesen backed his tank into a building for the night. He then dismounted to coordinate with Barkman. The situation was confused, Barkman related, but the Russians were still being kept from the bridge by the experienced and well-positioned German infantry. As Giesen and Barkman conferred, a tank suddenly appeared behind them. The infantry screamed that it was Russian. Giesen flew back to his tank as Barkman traversed his turret to the rear. The street was bedlam. German infantry and half-tracks were in Barkman's line of fire. A flare went up, illuminating the street. The Russian crew, suddenly realizing their situation, flew past Barkman towards their own lines. Barkman couldn't traverse his turret fast enough to draw a

bead on it. The Russian tank escaped.

Barkman restored order. He got the half-tracks off the street and under shelter. The infantry went for cover. Just as quiet once again returned to the street, Barkman's tank exploded, the victim of a *panzerfaust* (bazooka) fired by an urban guerilla from a building across the street. Barkman and his entire crew were killed. The German infantry reacted with a viciousness all too common on the Eastern Front. They cleared the building room by room with grenades and satchel charges, reducing it to rubble. Anyone inside, civilian or enemy military, were killed.

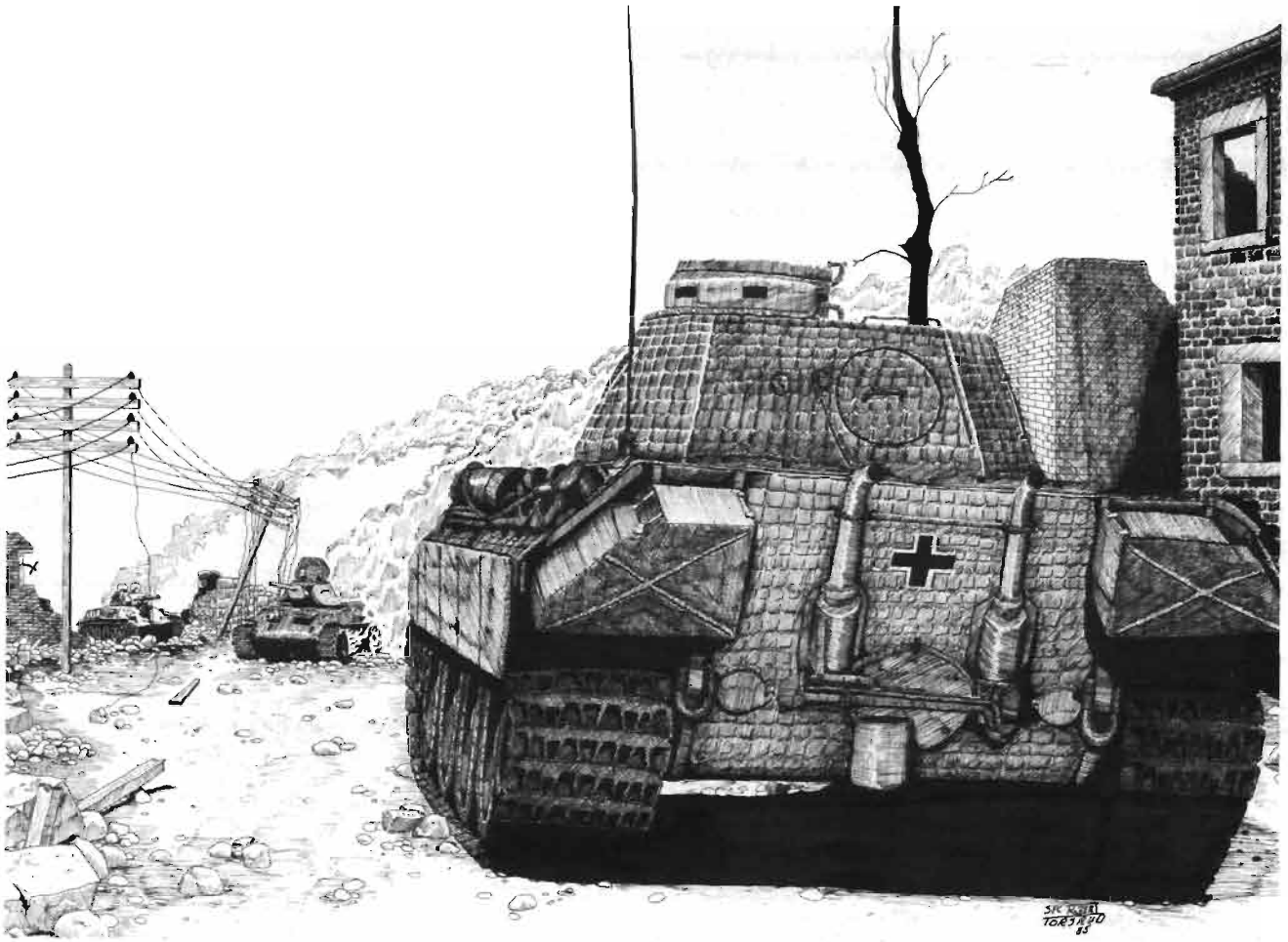
Giesen was finally able to take control and restore order. The street battle raged. The ammunition in Barkman's tank continued to explode. Giesen reported to regimental headquarters and received orders to hold the bridgehead until the following night. The street quieted.

Giesen instituted the sleep plan for his crew. At 0400 he was awakened with orders to move his tank to the infantry command post in control of the bridgehead. When Giesen arrived, the defense for that day was coordinated by *Sturmbannfuehrer* Schmidt, who was in charge of the command post. Giesen was informed that only his tank and one other, a Mark IV, were still operational. Four tanks had been destroyed during the night by guerillas. The infantry had the buildings and streets in the city blocked by dynamite charges and covered with automatic weapons from basements and rubble. The problem was the road along the riverfront park, which could not be blocked on the east side. The Mark IV, being the less capable tank, would protect the western approach to the bridge along the riverfront road behind a barricade of steel railroad ties. Giesen, along with two 75-mm antitank guns, would defend the eastern approach.

Giesen expressed his concern about guerillas. Schmidt promised to occupy or guard all buildings along the riverfront within the German sector, preventing any further attacks by guerillas on the remaining two tanks. Satisfied, Giesen's crew took up position in the riverfront park and settled down to what for them would be one of the busiest days of the war.

Giesen used the foliage in the park for concealment. Around 0800, the first T-34 appeared on a curve in the street 900 meters away to the east. Giesen let the enemy tank approach. The T-34 came forward a few hundred meters and then suddenly made a sharp left turn into a side street. At that moment, Ehegotz squeezed the trigger, hitting the T-34 in the right rear. The target exploded, the first of fourteen kills that day for Giesen. Throughout the morning, four more tanks appeared out of the side streets, and Ehegotz had a field day hitting them in the flank as they came into the open.

Around noon, a Russian jeep appeared with four soldiers waving a large Soviet flag and drinking vodka out of bottles. They appeared to be enjoying their ride along the beautiful riverfront park, until Rau and Ehegotz sprayed them with machine gun fire and killed them all (the Panther had a hull machine



gun operated by the radioman, along with the coaxial machine gun in the turret).

Russian infantry, meanwhile, was clawing its way from building to building along the riverfront towards the bridge. Giesen's tank started to receive hits from rifle grenades, which could not, however, penetrate the frontal armor of the Panther. Giesen backed his tank into hull defilade towards the Danube and then mowed the buildings occupied by the Russian infantry with machinegun and main gun fire, collapsing them. No more rifle grenades were fired at the Panther.

Early in the afternoon, IL-2 fighter bombers, the *Iron Gustav,* appeared overhead. They did not dive to attack like the German Stuka or the American P-47 Thunderbolt, but dropped their bombs while flying high and level. The bombs fell everywhere, on friend and foe alike. The IL-2s returned every 45 minutes that day, but never bombed with great accuracy.

Around 1400, the commander of the German infantry along the riverfront buildings, *Obersturmfuehrer* Weber, informed Giesen that a Russian Stalin tank was sitting in a side street just outside the German perimeter. The Germans had a great respect for the JS-III with its thick armor and 122-mm main gun. Giesen dismounted to make a leader's reconnaissance with Weber.

Through the labyrinth of rubble that was Vienna, the two made their way to a position from which they could observe the enemy tank. What they found was comical chaos. The Russian tank was sitting on a side street about 75 meters from the riverfront road and facing north. On top of it was a Russian infantry squad drinking, smoking, and taking a rest from the war. Giesen told Weber to have a squad of men ready with *panzerfausts* and automatic weapons. After Giesen shot the tank, the infantry should fire their weapons to clean up any survivors. Armed with the information gathered on his reconnaissance, Giesen returned to his Panther.

The Germans made a practice of distributing books to their tank crews with all technical data available on enemy armored vehicles. Giesen checked for the height of the Stalin tank. He wanted to lay the main gun for correct elevation and deflection before he moved on the better armed and armored Soviet vehicle.

Giesen briefed his crew, especially the driver and the gunner. The driver's task was especially difficult. Sternauth would have to move the tank forward until the gunner had a clear shot at the enemy vehicle. He would have to drive smoothly to provide a good firing platform (the shot would be made on the move). After the round went off, he would have to put the tank in reverse and get away from the Russian's field-of-fire in case Ehegotz missed. With the crew properly briefed, the main gun was laid for elevation and deflection, and a practice exercise was made in a short space in the park. The crew reported ready.

Surprise was crucial to success. The infantry fired their automatic weapons down the riverfront street

to the east both to discourage any Russian moves down the riverfront while Giesen was occupied with the Stalin tank and to drown out the noise of the Panther.

Sternauth nudged the Panther forward. The crew of the Stalin remained unaware of the impending doom moving towards them. The Panther crept on until the enemy tank filled the gunner's sights. The ride was steady, and Ehegotz fired. The 75-mm overlong barrel recoiled and the round found its target. It hit the forward flank of the Stalin just below the turret ring. The Stalin's fuel and ammunition exploded. Immediately, three *panzerfausts* impacted on the hull of the burning tank. Machine gun fire raked the entire area. For the rest of that day, the Soviets never again attempted to move down that street. Giesen moved his tank back down into hull defilade. The time was 1415.

Giesen's major worry was that the Russians would position an antitank gun at the curve in the street away to the east. For that reason, he positioned his Panther's well-sloped frontal armor in that direction. That decision would save his life, for in a few minutes three T-34s appeared at the end of the street in column, along with a platoon of infantry on foot. The Russians raced for the cover of the foliage along the river.

Giesen and his crew reacted automatically. Ehegotz fired round after round at the enemy tanks. Sprieg was busy pumping rounds into the breech. The main gun became a large caliber machine gun at the hands of the experienced crew.

It was standard operating procedure in the German army to operate with closed hatches in combat and the tank soon filled with fumes from the expended main gun rounds. The turret blower was kept off because it interfered with the crew's intercommunication system. Giesen vomited, but kept on fighting. All three T-34s were destroyed in a matter of seconds. Second rounds were fired into the dead hulks, causing catastrophic explosions. The German infantry screamed with delight and eliminated the Russian infantry platoon.

"Alwin, back up!" Giesen ordered. The tankers of the German army made it a point never to stay in the same place after firing several rounds from it. The chance of detection was just too great. Sternauth stomped down hard on the accelerator. The tank lurched back. Suddenly, an enemy round glanced off the front slope, just in front of the radioman's position.

"We're hit, we're hit!" Rau screamed.

"Shut up! Don't lose your head!" Giesen yelled back as he took charge of the situation. His fear had come true. While he was busy with the T-34s, a Russian antitank gun had been set into place to the east. It was kill or be killed.

"Guenter, suppression!" Giesen ordered. Rau regained his composure. The hull machine gun rattled away at the Russian gun crew to keep them occupied.

"Antitank gun!" yelled Giesen. An antitank round was currently in the breech, but it was faster to fire it off than to unload it. Ehegotz squeezed the trigger and emptied the breech.

"High explosive!" ordered Giesen. The loader obliged by loading an antipersonnel round.

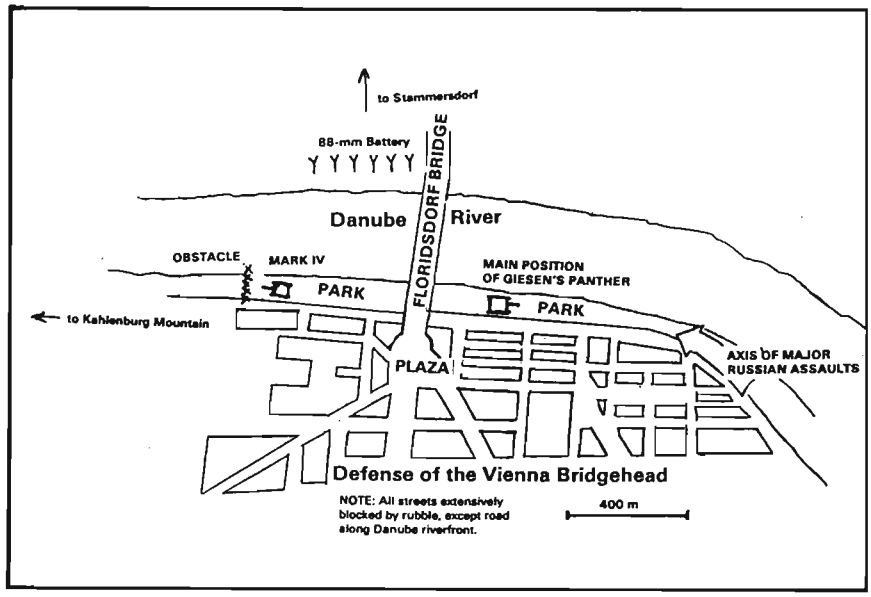
"Fire!" Giesen screamed, and round after round sought out the antitank gun and its crew. Smoke again filled the turret and Giesen vomited once more, but there was nothing left in his stomach. The antitank gun, however, was utterly demolished. The German infantry again screamed their approval and joined in the chorus with their automatic weapons.

"Alwin, back up!" The driver moved the tank back, this time into a hide position from which it could not be engaged. The danger, for now, had passed. The crew caught their collective breath. Giesen talked with Rau and calmed him down. In combat, an excited crew was a dead crew. The hatches were opened and the tank was aired out. Coffee was brewed to clear their parched throats. Sounds of the dead Russian vehicles still exploding could be heard in the distance.

Giesen planned his next move. He had to get his vehicle back into firing position. He ordered Sternauth to back the vehicle and to move up the slope in a different area so as not to reappear in the same position from which he had last fired. The front slope was still facing the curve. The time was nearly 1600.

Around 1700, four T-34s appeared at the curve and roared down the riverfront road towards the bridge, much like they had in the morning. Giesen's crew again reacted mechanically, for in combat there was

"...Around 1700, four T-34s appeared at the curve and roared down the riverfront road toward the bridge..."



no time to think about what had to be done. An antitank round was already in the breech. The gunner always engaged from front to rear. His range was set. Such being the case, the enemy tanks could be engaged with a minimum of commands. As the T-34s came on, they fired their weapons wildly into the houses along the riverfront. The experienced German infantry sat tight.

Giesen let the Russians close to within 300 meters before giving the command to fire. The first round hit the turret of the lead vehicle, partially dislodging it. The Russians panicked. They saw an escape route down a side street to the left and rushed for it. That was exactly what Giesen wanted. As the T-34s turned to enter the street, Ehegotz hit them in their flanks, destroying three out of the four. Dead Russian vehicles and personnel littered the street. Another assault towards the bridge had been crushed. No more Russian tanks would venture towards the bridge before sunset.

It was just as well for the Germans that the Russians did not attack again soon, for Giesen's turret had jammed. Giesen informed Weber and Schmidt that he would have to move his tank to the cover of the underground garage of a nearby building when darkness fell. At dusk, Giesen backed his tank all the way to the bridge, then moved forward and crossed the street into the safety of the underground garage. The crew went to work trying to find the obstruction in the turret ring. Rau and Giesen dismounted with *panzerfausts* as security.

Around 1900, the infantry used the lull in the battle to begin redeployment across the Floridsdorf Bridge. In small groups, on foot and in half-tracks, the infantry left the ruin of Vienna. German guns were ready on the north bank to silence any Russian fire directed at the bridge, but surprisingly the Russian reaction to the move was very lethargic.

Around 2030, Giesen heard Russian tanks approaching the bridge. They came past the hulks of their comrades and passed by the building where Giesen had hidden his tank. Giesen called the command post. "Don't get excited and blow the bridge, whatever happens, until I'm across!" he told them. It was the fourth time that day that Giesen had reminded the command post about that crucial issue. The situation, however, was under control. The Germans did not panic.

No infantry accompanied the Russian vehicles. They would not have made it to the bridge anyway, as the German infantry had the riverfront well-covered with automatic weapons. The Russian tanks drove up to the plaza by the bridge and stopped. There they formed a 360 degree perimeter. Giesen took Rau and three *panzerfausts* and went hunting.

They crossed the street into the riverfront park and crept up to the edge of the plaza. They could hear the Russians cursing inside their tanks, scared and nervous about the quiet surrounding them. Suddenly, the Russians started their engines and began to move back towards their lines. Giesen let the first two tanks pass and then Rau and he let loose with their *panzerfausts*. Giesen destroyed the rear tank, but Rau only clipped his target. Giesen let loose the third *panzerfaust* and the second T-34 also exploded. The other two T-34s headed at top speed for safety. No more Russian attacks would come that night. Giesen had just destroyed his thirteenth and fourteenth tanks this day, an admirable accomplishment by any standard.

Giesen returned to his tank and found out that his crew had cleared the obstruction in the turret. The infantry command post moved back and colocated with Giesen's tank. The infantry saw their opportunity during the lull in the battle after the destruction of the Russian tanks. Group after group crossed the bridge, evacuating the bridgehead. Giesen placed his tank behind a sandbag wall prepared for him by the infantry. Weber stayed with a machine gun crew as a rearguard. The time was 2130.

Giesen arranged with Schmidt that by 2245, all other vehicles and personnel would be across the bridge. The night was fairly quiet. At 2230, the Mark IV crossed the bridge. At 2300, the infantry command post evacuated.

"I'll see you in Stammersdorf," Giesen told *Sturmbannfuehrer* Schmidt.

"You seem to be pretty confident about that," Schmidt replied.

Giesen smiled. "I've been confident all day long."

Schmidt laughed. "I'll tell you what. I'll wait for you on the other side of the bridge."

"And you know what *not* to do when you get there?" queried Giesen.

"Yeah, I know," replied Schmidt, laughing. "Don't blow the bridge!"

Only Giesen's Panther and Weber's machine gun crew remained in Vienna. Giesen backed his Panther to the bridge, keeping his front slope towards the enemy. The infantry crossed the bridge on foot, using the railings as cover. Giesen gave them a few minutes and then followed, keeping his turret over the rear deck and facing Vienna. In a few minutes the Panther was across to the north side. The time was 2315, 13 April 1945. The Vienna bridgehead had been safely evacuated.

For his heroic efforts in resupplying and defending the Vienna Bridgehead, Giesen was awarded the Knight's Cross.

FIRST LIEUTENANT (P) PETER R. MANSOOR was commissioned in Armor from West Point in 1982, the top cadet in his class. He was also an honor graduate of the Infantry Mortar Platoon Course and the Armor Officer's Basic Course and is a graduate of the Airborne Course at Ft. Benning, GA. He served as tank platoon leader, D Company, 3d Armored Cavalry Regiment, cavalry platoon leader in A Troop and as XO, D Company. He is currently assistant regimental S3 with that unit.

Trunnions on the Move

by Robin Fletcher

Editor's Note: For many years, ARMOR has published speculative articles analyzing possible future tank designs. While these articles are often somewhat technical and theoretical, it is important for soldiers who employ tanks to understand the thinking of the engineers who design them.

Robin Fletcher, the author of this article, contends that the conventional turreted tank has reached a developmental dead end. In this first part of a two-part presentation, he details the problem. In our next issue, he will describe two "gun-over-hull" designs that could solve many of the problems he identifies.

Advantages and Disadvantages of the Tank Turret

The advantage of the turret is that it allows the gun to be traversed round the vehicle through the full 360 degrees, even when the tank becomes bogged down or has its suspension destroyed by mines. With its gun carried in a turret, the tank is able to switch rapidly from target to target over wide arcs both in the defense and also in the attack. It can remain in concealment, tracking an approaching target before suddenly opening fire. The turret gives the tank great tactical flexibility and is a method of gun mounting which has proven itself with tank crewmen.

In a turret, the tank commander has all-round surveillance vision from the highest point of the vehicle, so that on the battlefield, he can form an appreciation of what is going on around him. The turret also provides full protection for the gun's breech system and allows reloading to be carried out under armor. The conventional turret also allows crewmen hand access to the breech of the gun, to the firing system, and to the automatic loading mechanism, if such a system has been provided.

But the tank turret presents a large target to enemy return fire, both when the tank is exposed in open country and also when it is engaging from behind cover. The height of the turret can be reduced by restricting the headroom made available to the loader, by requiring him to load seated or, finally, by eliminating him entirely and introducing automatic loading.

The height of the turret roof above the gun trunnions is determined by the position of the recoiled breech of the gun when at full depression, so the 10 degrees of depression which are normally provided will raise it considerably. The width of the turret's silhouette has recently been significantly increased by the addition of compound armor. This has made it both more easily spotted and also more easily hit by the enemy.

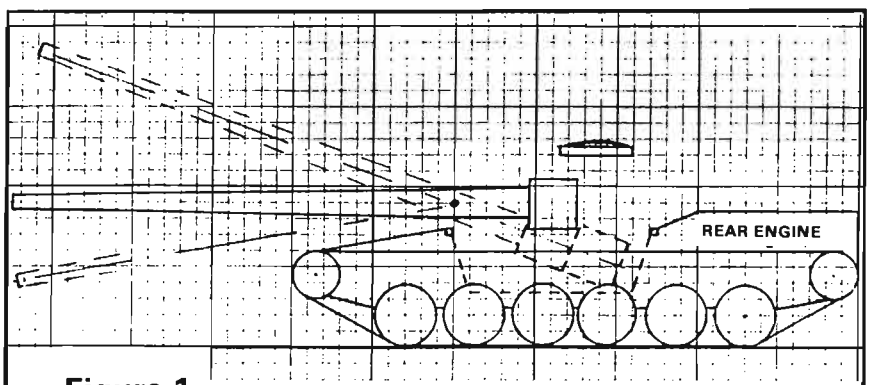


Figure 1

With a conventional, turreted rear-engine design, the muzzle projects forward and the breech intrudes into the fighting compartment when gun is depressed. A flat turret will reduce the height of the roof and the vision cupola.

The weight on the gun trunnions — now some 4 tons in the case of a MBT — combined with the weight of the thick frontal armor, tends to throw the turret out of balance forward. Either this can be tolerated, as is Russian practice, and a powerful traverse system provided to overcome imbalance when firing on a side slope, or a bustle can be added at the rear of the turret to balance it. But this will increase the size of target presented to flank fire by the sides of the turret. The bustle can be used to accommodate radios, power traverse components and batteries, or can be sealed and fitted with blow-off panels to act as vented ammunition stowage (e.g., Abrams).

Adding a bustle and compound armor to the outside of the turret increases the turret's rotational inertia, reducing its ability to switch rapidly from target to target or requiring more power to maintain its same traversing performance.

The tank gun is designed to have a short "inboard length" to the rear of the gun trunnions — a dimension of 55 inches is typical — but this, combined with the added space needed for recoil and reloading, intrudes into the turret and effectively divides it into two parts while in action. When the gun is in full elevation, the gun intrudes downwards into the lower part of the fighting compartment — in fact, into the hull of the vehicle — requiring space to accommodate it (Figure 1).

In a conventional turret mounting, the gun muzzle also projects a considerable distance in front of the turret, requiring a large arc to be clear of trees, buildings and other battlefield obstructions. Cross-country movement is made difficult by this forward projection of the gun muzzle and the turret may have to be traversed to one side or even to the rear to allow the tank to surmount obstacles.

Having reviewed the advantages and disadvantages of the conventional tank turret, attention can now be directed to steps which have

already been taken, or which might be taken, to improve it.

Improving the Tank Turret

The Compact Turret was designed by Clifford Bradley in America in the 1960s. The tank commander was located immediately to the rear of the gun mounting and the gunner and the loader were lowered close to ring level so as to bring about a considerable reduction in the width of the target presented. This configuration was used in the American M60A2 mounting the Shillelagh 152-mm gun/missile launcher, now withdrawn from service. This type of turret was also proposed for mounting conventional, long-barreled high-velocity tank guns.[1] It can be criticized for failing to reduce the size of target presented to flank fire, but it did allow continued hand access to the breech of the gun and, most importantly, it maintained top vision — the ability of the tank commander to look all around him from the highest point of the vehicle.

Recently, attention has been directed towards the so-called Flat Turret, which reduces turret height by allowing the recoiled breech to rise above the roof when the gun is depressed. A flap is to be opened in the roof to allow the breech to move upwards, in which case hand access may be able to be retained, but until details of this configuration become available, it is not possible to describe how sealing is to be maintained or protection from overhead attack is to be provided.[2] Alternatively, the gun can be carried and automatically loaded in a central cleft dividing the turret, with hand access only possible in an emergency. Rheinmetall of Germany, who have proposed this configuration[3], are aware that permanent separation of the two turret crewmen by this central cleft may be judged to be unacceptable and have, therefore, also put forward an alternative two-man turret, with the crewmen seated in tandem in the conventional manner and with automatic loading taking place from the other side of the gun mounting. This layout has been adopted by the recently announced FMC Armored Gun System shown at the AUSA Show in October 1985[4], but a bulkhead has been introduced between the two crewmen and the automatically loaded gun and they will only be able to reach it with difficulty. Both the Flat Turret and the Rheinmetall proposal reduce turret height and also target height when firing over a crestline with the former claiming to be able to do so with the gun still internally mounted while the latter admits to the gun having to be mounted externally.[5]

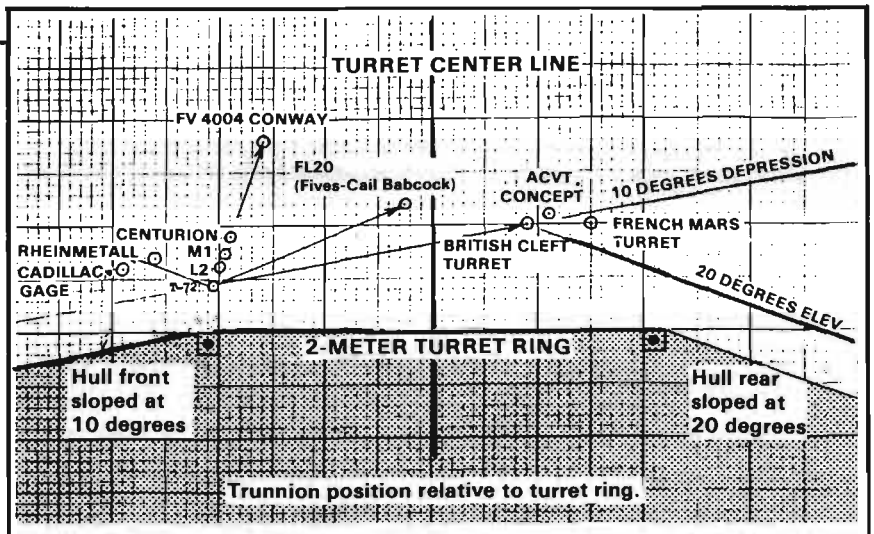


Figure 2

Schematic shows relative position of trunnions on eleven vehicle designs, relative to a common 2-meter turret ring.

Several reasons — such as the addition of a muzzle brake, longer recoil to reduce trunnion pull and the need for space for autoloading at the rear of the gun — have led to a recent tendency for the gun trunnions to be moved forward of the front of the turret ring. This is by a small amount in the case of the Rheinmetall LPTS turret system, by a larger amount in the Royal Ordnance/Cadillac Gage low recoil turret[6] and apparently even further in the case of the FMC Armored Gun System. If the usual 20 degrees of maximum elevation is to be maintained, this will lead to the trunnions being raised higher above ring level, which will raise the height of the roof of the turret and will also present a considerable blast trap under the front of the mounting (Figure 2).

The American ARES 75-mm automatic cannon is normally mounted with its center of gravity well forward of its trunnions, which are located so as to coincide with the weapon's rotating chamber. Equilibration is then provided to balance the gun. This increases the gun's forward projection, but decreases the intrusion of the gun mounting into the turret to such an extent that it is possible for the commander to be seated immediately behind the gun mounting, retaining his top vision.[7]

If this one remaining crewman could be removed from the turret and direct top vision was deliberately abandoned, the resulting "unmanned turret" could be controlled and sighted remotely by crewmen seated low in the hull.[8] Given the short "inboard length" of the equilibrated ARES cannon, it could even be installed in a special, remotely-controlled, automatically-loaded turret on a ring only 54 inches in diameter.[9]

A similar unmanned turret in the experimental American Tank Test Bed (TTB) vehicle is controlled remotely by crewmen seated in the front of the hull.[10] Loading arrangements, disclosed at the AUSA Show in Washington in 1983, showed rounds carried vertically, projectile downwards, in the turret basket below ring level. Each round is swung up to a horizontal position above the rear of the ring before being rammed forward into the breech. Direct top vision would, of course, have been sacrificed, as would hand access to the breech and to the loading mechanism, but the crewmen would be well-protected behind the increased armor on the front of the hull.

These various arrangements — these improvements to the conven-

tional tank turret — will not be able to reduce, and may actually increase, the forward projection of the gun muzzle, although they will probably reduce the turret's rotational inertia. But these arrangements may divide the turret in two by the intrusion of the gun mounting, may even cause the gun to be externally mounted and, in seeking to expose the smallest possible target, may finally cause the tank commander to surrender his top vision. So an improved method of gun mounting is now needed and a major alteration of the position of the gun trunnions, relative to the turret ring, appears to be indicated.

Relocation of the Gun Trunnions

If the gun trunnions are moved from above the front of the turret ring to the rear, then the forward projection of the gun muzzle will be cut down, the turret will become much better balanced and its rotational inertia will be reduced. Also, the breech of the gun, and its associated recoil and loading space, will no longer intrude downwards into the turret ring and the lower part of the fighting compartment. Therefore, the crewmen will no longer be separated by the central gun mounting. If the gun is carried above the turret ring, perhaps in some form of cleft turret, then the crewmen will be able to maintain contact, or even to change places, beneath the shallow cleft.

More specifically, this new trunnion position will be determined by the point of intersection of two lines, one the gun center line at full depression with the barrel just making contact with the front of the ring and the other the gun center line at full elevation with the rear part of the gun just contacting the rear of the ring. It is likely that the breech of the gun and its recoil and loading space will descend to below ring level at the rear of the ring when in full elevation, so it will be necessary to slope the rear hull deck armor downwards at an angle of 20 degrees to match the angle of maximum gun elevation. Note that this new trunnion position is bound to be higher above the ring than the old forward trunnion position. On an 85-inch ring, this increase in height will be some 10 inches. This is an admitted disadvantage of the proposed new rear trunnion position and will be considered more fully a bit later.

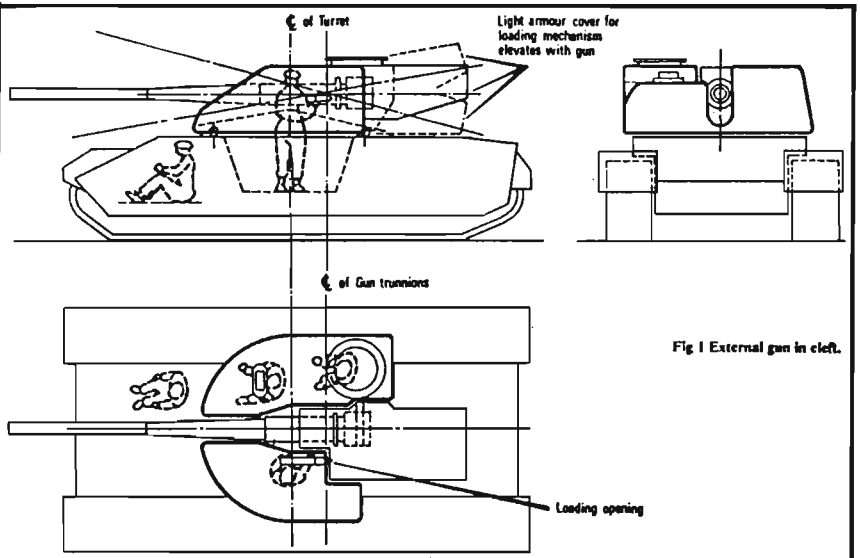


Fig 1 External gun in cleft.

In the experimental British cleft-turret design of the 1950s, the loader fed rounds into a transfer mechanism. The rounds were automatically rammed forward after the gun approached the center-line of the hull (see also Figure 3, next page).

However, instead of moving directly from the front trunnion position to the rear, let's look at several intermediate solutions, each having its own advantages and disadvantages.

If a large tank gun must be installed on a small turret ring, and the gun trunnions cannot be moved forward and equilibration is not acceptable, then the trunnions may be raised high above the front of the ring so that reloading is only possible out of the bustle at the rear of the turret. This has sometimes been referred to as a "gun-above-ring" mounting, although logically this designation should also be applied to all designs which adopt the rear trunnion position. They all confine the gun to above ring level. This configuration was used in the Russian KVII heavy tank and in some World War II artillery mountings. It was also used in the 1950s when the 20-pdr. tank gun was mounted on the Cromwell hull to create the Charioteer antitank vehicle, but elevation and depression had to be restricted to 10 degrees and 5 degrees, respectively, to contain the height of the turret.[11] This same type of mounting was also used experimentally to install a 120-mm gun on a Centurion hull to create FV4004 Conway.[12] Although this configuration tends to create a very high turret, it does maintain crew access to the breech of the gun for hand loading and for the rectification of malfunctions and it also retains the tank commander's direct top vision.

The French oscillating turret occupies an intermediate position between front and rear trunnions. The hand-loaded FL11 turret on the Panhard EBR 8-wheeled armored car placed the trunnions towards the front of the ring and used the upper part of the turret as a counterweight to the gun.[13] The automatically-loaded FL10 turret of the French AMX-13 light tank, and the subsequent FL12 turret, with 105-mm gun, carried on the Austrian Kurassier tank destroyer,[14] located the trunnions further to the rear, just forward of the center of the ring, but limited elevation to 12 degrees to prevent the rear of the turret from making contact with the rear deck. Oscillating turrets were also tried experimentally on the American T-69, T-54 E1 and T-77 medium tanks in the 1950s, but were not put into production. The oscillating turret retains both hand access to the breech of the gun and also the tank commander's top vision. Fives-Cail Babcock, its French designers, say that with their new FL20 turret, they can stabilize the complete upper part of the turret, and with it the gun, the crewmen themselves, and their vision devices.[15]

A third type of intermediate configuration places the gun trunnions at the new rear position, at the intersection of the gun center lines

when at full depression and full elevation, but will not insist on the rear of the hull being sloped downwards. Designs of this type enclose the breech of the gun and its recoil and loading space in armored protection, which has the effect of counterweighting the gun and causing it to move forward. This allows the turret to be installed — as was the French oscillating turret — upon a horizontally decked hull (Figure 3).

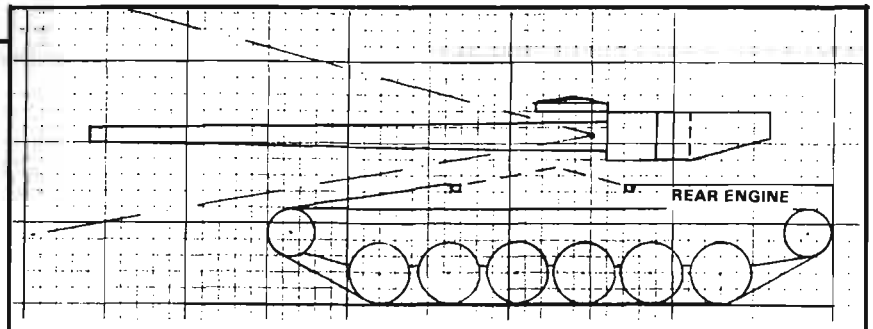


Figure 3

British cleft turret on horizontally-decked rear-engined hull limits elevation to 15 degrees. Rounds are hand-loaded rearward into an armored box enclosing rear of gun, then mechanically rammed forward into the breech.

The first turret of this configuration was the British cleft turret of about 1950, originally designed to be only lightly armored, which retained commander's top vision and which was reloaded by one of two turret crewmen. He loaded rounds, base first, out of the rear of the turret into an armor-protected transfer mechanism, which then moved the round on to the gun center line and rammed it forward into the breech. Subsequently, this configuration was considered in a more heavily armored form with three turret crewmen during the development of the British Chieftain MBT.[16]

The second example is the lightly armored Hispano-Suiza CNMP MARS turret recently developed in France. In this design, rounds are also passed individually, base first, into a rear armored box and then transferred to the breech of the gun.[17] But in this case, the roof and the crew stations have been lowered to close above ring level, reducing the target presented to enemy fire, but at the same time sacrificing top vision. This is unlikely to be acceptable to the tank commander of a MBT who will fear that the enemy may observe the gun mounting above his vision devices before he is in a position to see the enemy. Although he may be provided with a tall panoramic periscope looking out above the highest point of the vehicle, he can only observe a narrow field at any time and he will fear that he will be surprised from another direction. This whole question of the surrender of direct top vision is of vital importance and will be discussed more fully, but here, it is sufficient to note that in the interest of weight saving and target reduction, top vision has been surrendered.

Another example of this particular configuration can be found in American proposals made in 1980 for an ACVT Concept Vehicle mounting an ARES automatic cannon. As in the MARS turret, the turret top had been lowered to just above ring level and direct top vision abandoned.[18] In this case, the abnormally short inboard length of the equilibrated automatic cannon allowed rounds to be loaded — not rearward as in the MARS turret — but straight upwards into the chamber. The turret could be carried on a hull which was not only horizontally decked, but which actually had raised rear hull deck armor.

New Tank Gun Needed

The tank gun will be in a very different situation when it is removed from the front of the conventional turret and relocated much further to the rear. No longer will its breech and its associated recoil and loading space be contained within turret armor. It will now project to the rear of the turret and above the rear of the hull of the vehicle. This will immediately allow the distance between the rear of the gun and its center of gravity to be increased to any length thought to be appropriate by lightening the breech ring assembly, by fitting a brake to the muzzle or by increasing the length of the barrel. And since the gun will now be in a "gun-above-ring" mounting, it will not intrude into the lower part of the fighting compartment and the two turret crewmen can be seated on either side of the gun mounting with close contact remaining possible between them.

But with the breech now well to the rear of the turret, crewmen will no longer be able to reach it by hand. As a result, the reliability of remote operation will become of the greatest importance; and it is doubtful this can be achieved simply by depending upon recoil. In addition, some form of external power will be required for the automatic loader —which will then have become absolutely essential — and to download rounds back to ready-round stowage if the wrong type of round has been loaded. The breech system, now exposed, will be subject to direct small arms and splinter attack, making retention of the present sliding block breech system unlikely. The combination of these factors makes it probable that a lighter, power-operated, screw breech system will need to be provided, which when closed will become self-protecting. Such a new breech system may be combined with existing gun barrels or may form an integral part of a rearward barrel extension of an entirely new tank gun.

Although it might be possible to employ existing rounds, using cases or at least stub cases, with case ejection taking place directly over the rear of the vehicle, this would probably only be used as an interim solution, giving way to parallel-sided fixed rounds of reduced length using completely combustible cases. A simple, cylindrical shape would be most easily handled in stowage and by the automatic loader, and combustible cases would leave no debris to give away the vehicle's presence.

Study of a variety of different unorthodox gun mountings shows that rounds will either approach the breech from the rear and be rammed forward into the chamber or they will be supplied from the direction of the gun trunnions and will then have to be moved a considerable distance rearward, to beyond the rear of the gun, before being returned forward. If, in this latter case, the gun could be divided

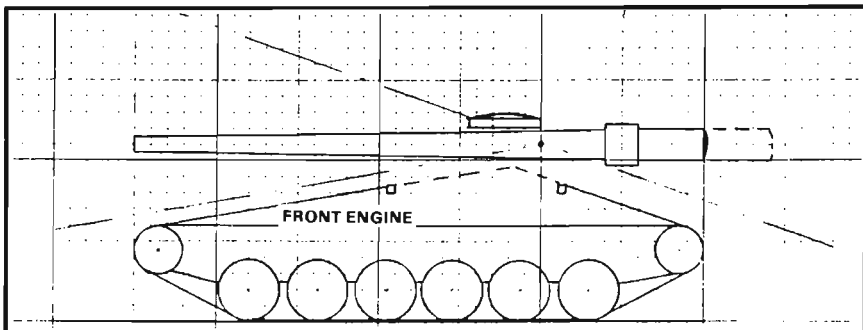


Figure 4

In this design, a cleft turret on a front-engined hull, a controllable suspension system could help to elevate and depress the gun which would reduce both turret height and overall vehicle height.

around the front of the chamber and its rear portion then inclined or moved sideways, it would become possible to load the parallel-sided rounds directly, base first, into the chamber in one simple rearward movement before reassembling the gun for firing. Such a "divisible gun" has recently been suggested for use in a turret which uses front trunnions,[19] but it would be even more beneficial when the introduction of rear trunnions moves the rear of the gun well to the rear of the turret (Figure 4). The breech system of the present ARES automatic cannon makes it suitable for this type of treatment, with the chamber being moved to one side to be loaded instead of rotating. It is even conceivable that, in an emergency, rounds might be able to be hand-loaded into the chamber directly out of the rear of the turret.

Thus, although a conventional tank gun can be employed initially — and, as has been seen, can be used with its breech system enclosed in an armored box above a horizontally decked hull (e.g. MARS turret) — a new tank gun system is now needed, probably with a power-operated screw breech system and with its center of gravity much further forward. This new gun system will have been specifically designed for installation upon rear-positioned gun trunnions and its introduction will allow the full potential of gun-above-ring mountings to be realized.

Towards a New Turret System

It is not being suggested that the conventional tank turret should be abandoned in favor of turret configurations which employ the proposed new rear trunnion position, but rather that the limitations of the former should be frankly acknowledged and the possibilities of the latter should be fully appreciated and exploited. The conventional turret may continue to be used in particular circumstances, where hand loading and hand access to the breech of the gun are considered essential.

The disadvantages of the conventional front-trunnioned turret as regards muzzle forward projection, turret balance, rotational inertia and gun intrusion are now well-appreciated. These problems will be increased if a muzzle brake is added or if the length of the barrel is extended in order to increase muzzle velocity.[20] If the trunnions are moved forward of the front of the turret ring, then turret height will be increased and so will the size of the blast trap under the front of the mounting. Raising the gun trunnions high above the front of the ring and reloading out of the bustle — as in the British Conway experimental vehicle — cannot be considered as a serious alternative because of the greatly increased height of the turret. Nor can the oscillating turret be favored if it has to be armored to MBT standards.

Should a Flat Turret be adopted, there may be a sealing and protection problem or the gun may have to be mounted externally in a central cleft which will divide the turret. And an unmanned turret, as in the Tank Test Bed vehicle and in some ARES proposals, raises even greater problems of remote gun operation and would also require the provision and acceptance of some form of remote vision.

The British cleft and the French MARS turrets, which are so dissimilar in the size of target which they present to enemy fire and in their top vision retained or surrendered, both adopt the new rear trunnion position. But both then have their guns advanced forward by the weight of their rear loading boxes. If this counterweighting effect is removed — as it should be in the interests of overall weight reduction — then the breech and its recoil and loading space will be moved much further rearward and will swing down to below ring level when the gun moves to full elevation. This will require that the roof at the rear of the hull will have to be sloped downward at some 20 degrees to match the maximum angle of gun elevation and indicates a clear preference for a hull layout which uses a front engine (e.g. Israeli Merkava MBT).

Thus, with the exception of those turrets which adopt counterweighting — or, in the case of the ARES cannon, equilibration — to fit them for installation upon horizontally-decked hulls, there do not seem to be any acceptable compromise configurations lying between present conventional turrets which employ front trunnions and those which will adopt rear trunnions and a sloping roof at the rear of the hull. There is unlikely, therefore, to be a slow transition from front trunnions to rear through viable intermediate configurations, but rather an abrupt revolutionary change from one form of gun mounting to the other. And the new trunnion position will tend to be at a greater height above the ring, the breech end of the gun will be exposed to the rear of the turret, and automatic loading will have become quite essential.

Mounting the Gun on a Tank

Now that we have considered the relocation of the gun trunnions relative to the turret ring, let us develop the same theme even further and consider the mounting of the gun not just in relation to the ring, but in a wider context, with direct reference to the tracked hull of the vehicle. More specifically it would be the front and the rear of the top run of the tracks that would form the reference points.

The gun would then be located centrally and symmetrically above the hull of the vehicle, whose length it would match closely, and a va-

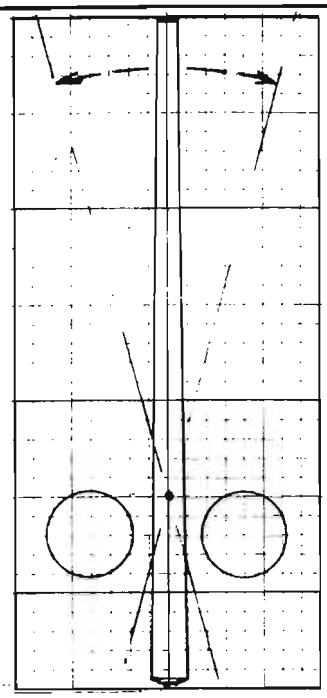
riety of different gun mountings would be introduced between the gun and the hull to provide elevation and traverse. Many different methods of mounting the gun have been proposed or could be suggested and they will now be grouped and reviewed in three separate series to discover which will prove the most suitable.

I. Casemate Configuration

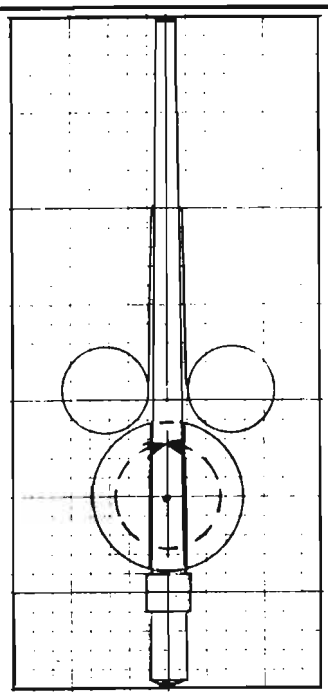
The first type of mounting in which the gun might be carried is often referred to as the "kasemattpanzer" or "casemate" configuration. The crew is not mounted in a turret at all, but occupies fixed hull crew stations. But, following the theme of the rearward movement of the gun trunnions, designs that mount the gun in the front of the hull, as in Jagdpanzer Kanone,[21] or in more heavily armored vehicles similar to the Jagdpanther of WWII,[22] will be rejected in favor of designs that move the gun much further rearward and centralize it above the hull of the vehicle.

One example of this type is the unique Swedish 'S' Tank, built in the 1960s. Its gun is fixed not on, but actually *within* its hull, which aligns the gun on the target by tipping the complete vehicle back and forth on a controllable suspension system and traverses it by the differential action of its tracks. Other nations were unwilling to accept this as a valid MBT configuration: they did not like having to turn the complete vehicle to engage targets to right or left, found it difficult to track moving targets, and discovered that although the 'S' Tank could be developed to fire on the move, this could only take place in the vehicle's direction of travel. But the 'S' Tank configuration still remains one of the available options: its clean, compact shape argues in favor of its adoption if vehicles must be of reduced signature and are to be clad in reactive armor against the increasing threat of overhead attack.

The 'S' Tank, like the conventionally-turreted tank, has the important advantage of retaining direct crew surveillance vision at the highest point of the vehicle. Its overall height should be less than that of the turreted tank and the target which it presents when firing over a crestline is low but is of considerable width if measured to the outside of the track guards. Since there is no relative movement between the gun and the hull, the automatic loading system can be comparatively simple, and with the gun contained within the hull, there is access to the breech and to the autoloader if it malfunctions.



Casemate tank with limited traverse on gun trunnions over the rear of the hull.



Casemate Tank with UDES-17-type "lift-and-turn" mounting and 360-degree traverse.

Figure 5

Casemate Configurations

It has often been suggested that the short length of track on ground, which causes the 'S' Tank to pitch during cross-country movement, could be avoided by mounting the gun on trunnions outside the hull armor and providing it with elevation and depression. This could simplify the vehicle's suspension but would require a more complicated loading system and some form of breech armoring. The infinitely variable steering system, however, would still be required for gun traverse.

Modification might be carried even further by providing some measure of limited traverse. While this would allow it to fine-lay and to follow moving targets without having to traverse the complete vehicle, it would also lead to a more complicated gun mounting and loading system.

Rheinmetall of Germany showed an illustration of such a vehicle at the 1983 AUSA Show,[23] with an automatically-loaded low-recoil 105-mm tank gun carried on an 8x8 armored hull with two fixed crew stations, one on either side of the gun mounting.

An even more advanced gun mounting system can be introduced based on the Swedish UDES-17 design, proposed in the late 1970s (Figure 5.). Here, the gun was to have been carried externally but lowered between two fixed hull crew stations. When ready to fire, it could then be raised and traversed to engage flank targets.[24] This particular "lift-and-turn" mounting had to return to the 12 o'clock position and be lowered again to be reloaded, then raised again and traversed back onto the target. Such a gun mounting configuration can retain direct crew 'top vision' up until the moment the gun is raised, but the repeated traversing and re-traversing of the gun to fire each individual round could give away the vehicle's position.

II. The Overhead Gun

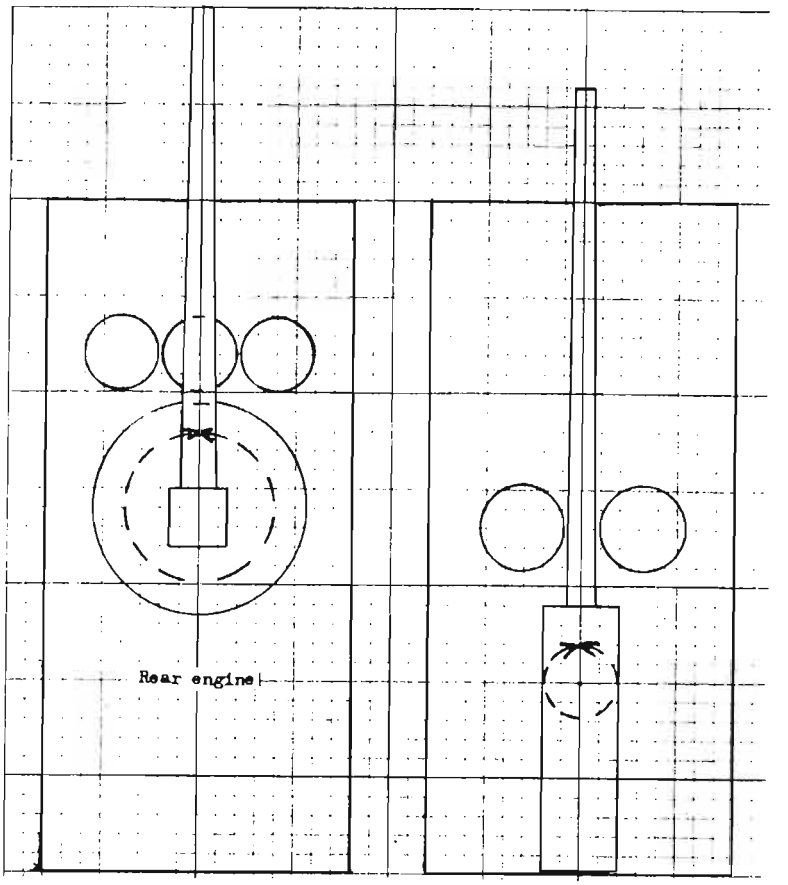
The overhead gun has long held a fascination for tank designers because the gun mounting will pre-

sent only a very small target when firing over a crestline and because the weight saved by reducing or eliminating the turret can be applied as additional armor on the hull front. This configuration can be approached by a final development of the front-trunnioned tank turret to become an unmanned turret, as in the American Tank Test Bed vehicle.[25] Alternatively, an externally mounted gun can be placed above a turret ring or on a pillar mounting, which would be of reduced diameter and might have bearings both in the roof armor and also in the floor of the hull (Figure 6).

The TTB employs an automatic loader originally intended for a manned tank turret. The human loader would have been superseded by a loading system which would have raised rounds to above the rear of the ring and then loaded them forward into the gun. Moving the two remaining turret crewmen down into the hull will leave the gun still internally mounted within turret armor, but although the breech will swing down into the hull on elevation, they may not be able to reach it to rectify malfunctions.[26]

The more radical overhead external gun configuration, which carries the gun above a ring or on a pillar mounting, may be held to have originated with the British test bed vehicle constructed in the late 1960s.[27] Similar designs have been produced more recently in Germany and in Sweden, based on the hull of the Marder MICV, with the German vehicle bearing the designation VT S-1.[28]

Several different problems arise, particularly when the latter configuration is adopted. The first is that the gun mounting will remain fully exposed some distance above the hull of the vehicle, giving rise to the two separate problems of 'prominence' and vulnerability. The prominence arises from the fact that the full 20-foot length of the gun will form a straight line well above the roof of the vehicle to stand out as a discontinuity above whatever cover it may be occupying. The small target presented by the front of the gun will reduce the chance of the enemy being able to hit it and the addition of a small amount of armor may be able to provide protection, at least against return fire from the particular target which it is engaging. But the gun and its mounting will have to be able to withstand enemy fire not only from straight ahead but also from other directions. Protection from small arms fire and splinter attack should be possible, particularly if a screw-breech or a divisible gun has been provided, but the mounting and the sighting system will also need to be protected.



Overhead gun internally mounted in an unmanned turret (TTB Vehicle).

Overhead gun externally mounted, as in the Swedish UDES-19.

Figure 6

Overhead Gun Configurations

The transfer of rounds to the gun from the hull of the vehicle provides the second set of problems, and the automatic loading system itself may also need protecting. Rounds may not be able to be supplied from the direction of the gun trunnions because of the small diameter of the gun mounting pillar but may have to be raised up from the rear of the hull and loaded into the breech from that direction. This may only be possible when the gun is in the 12 o'clock position, but more advanced systems, such as that used by the Swedish UDES-19 design, are able to transfer and load rounds whatever the gun's elevation and traverse.[29]

An alternative is to carry at least a proportion of rounds on the gun itself, where reloading will be easily accomplished, and then to recharge this ready-round magazine from hull stowage during a break in the action. The disadvantage of such a configuration is that this "firepower pack" will be bound to have larger dimensions and enemy fire will, therefore, be more likely to hit it.[30]

With both the unmanned turret and the overhead external gun mounting, crew vision remains the most intractable problem. By this, I don't mean high power, high resolution vision for observation, target identification or sighting, but general all-round wide-angle surveillance vision where high resolution is not so necessary. Perhaps consideration of this problem can be refined further by saying that a package of remote vision sensors

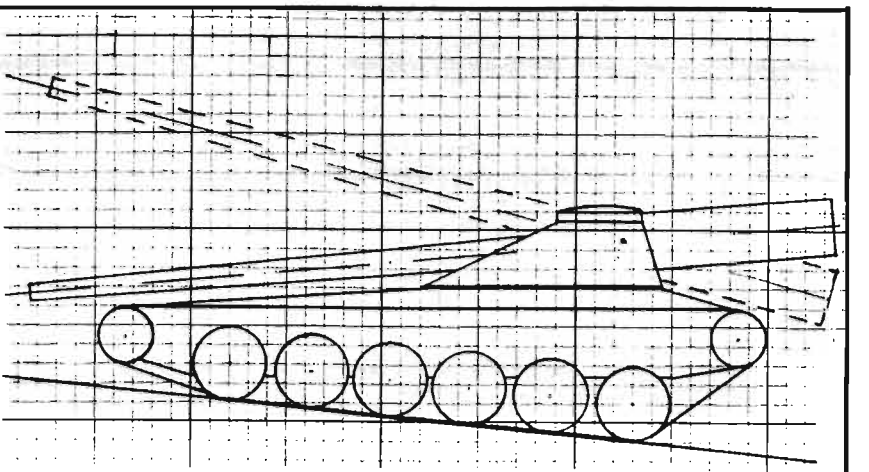
can be mounted on top of the gun mounting. But more important is the presentation of their information to the tank commander in the vehicle's hull.[31] Providing him with a single, fixed screen will not only restrict his field of view but may cause him to lose orientation — if not to become actually ill as the sensor head is rotated during cross-country movement. Ideally, he should be surrounded by a screen onto which would be projected a stabilized image of the scene around the vehicle, giving him both wide-angle vision and also orientation. But space limitations may not allow this. An accceptable compromise might be to provide him with a helmet-mounted display, as in the AH-64 Apache attack helicopter, with the television or thermal-imaging sensor head driven by a helmet position sensing system. This would do nothing to increase his field of view, which would remain restricted, but would preserve his orientation by allowing this field to be turned instantly by natural head movement.[32]

So seriously regarded is this problem of crew 'top vision' that the experimental Swedish articulated tank destroyer UDES XX-20 seated the commander in a lightly armored capsule. This capsule could rise above the level of the gun mounting to re-establish direct wide-angle top vision.[33] If this had to be done for an experimental anti-tank vehicle designed to engage only when stationary, how much more important will be direct top vision for a main battle tank committed to a war of maneuver? The American Surrogate Research Vehicle (SRV) has been constructed to study the problem of remote top vision,[34] but until a satisfactory solution is forthcoming, the overhead gun may be used for defensive or specialist vehicles but will not be accepted as the means of mounting the main armament of the main battle tank.

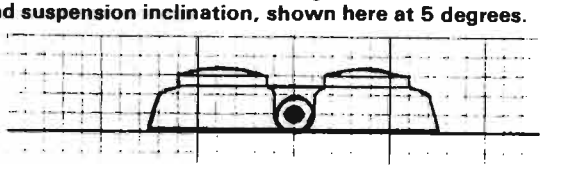
III. The Gun-Above-Ring Configuration

The third series of gun mountings to be considered is composed of those in which the gun is drawn back above the turret ring, and does not, therefore, descend down into it. In this type of mounting, the crewmen move around with the gun to face in the direction of the target. In many respects, the French oscillating turret can be considered to have been the first of this series with the British cleft turret following closely behind it. In the French design, the trunnions are normally forward of the center of the ring, but the trunnions of the British turret are further to the rear. Earlier, I pointed out that the trunnion position of both are likely to be some 10 inches higher above the ring than on more conventional front trunnion turrets, including the recently developed flat turret.

The size of target presented by a cleft turret can, of course, be reduced by lowering the two halves of the turret until the crewmen are looking out close above ring level. This was examined in several German experimental designs and has been adopted as the configuration of the French MARS turret. While the German mountings had silhouettes similar to that of a true overhead gun, the French design used a conventional tank gun and enclosed its breech in an armored box, presenting a somewhat larger target. The MARS turret differs from the British cleft turret in quite deliberately giving up top vision, and so suffers the same vision problems as the series of gun mountings, already discussed, which use the overhead gun. The MARS turret may be an acceptable way of putting a big gun on a specialist light vehicle, but its lack of top vision makes it unsuitable for the more heavily armored main battle tank.



Above, side view of MPG system, a cleft turret design with conventional hand-loaded tank gun and suspension inclination, shown here at 5 degrees.



View of turret at full depression over crest.

Figure 7

The designer is thus faced with the problem that retention of direct top vision and reduction in the size of the target do not fit easily together. Since an acceptable remote surveillance vision system has not yet been developed, direct top vision must continue to be provided and effort must, therefore, be concentrated on reducing the size of the target. In the general case where the vehicle is fully exposed in open country, this will mean finding ways of reducing the height of the turret and reducing the overall height of the vehicle. In the particular case where the vehicle is engaging over cover, it will mean reducing the size of target which will be exposed over the crestline.

One method of doing this is the controllable suspension system of the existing Japanese Type 74 MBT, in which 6.5 degrees of depression and 9.5 degrees of elevation available at the gun trunnions are augmented by the ability to incline the whole vehicle 6 degrees backwards and forwards and some 9 degrees sideways.[35] In addition, the Type 74 can be lowered and raised on its suspension. This offsetting of depression lowers the height of the Type 74's front-trunnioned turret and of the whole vehicle. The same method could be used to reduce the turret and vehicle height of a rear-trunnioned cleft turret design. The degree of offset provided may be restricted by the desire both to keep the length of

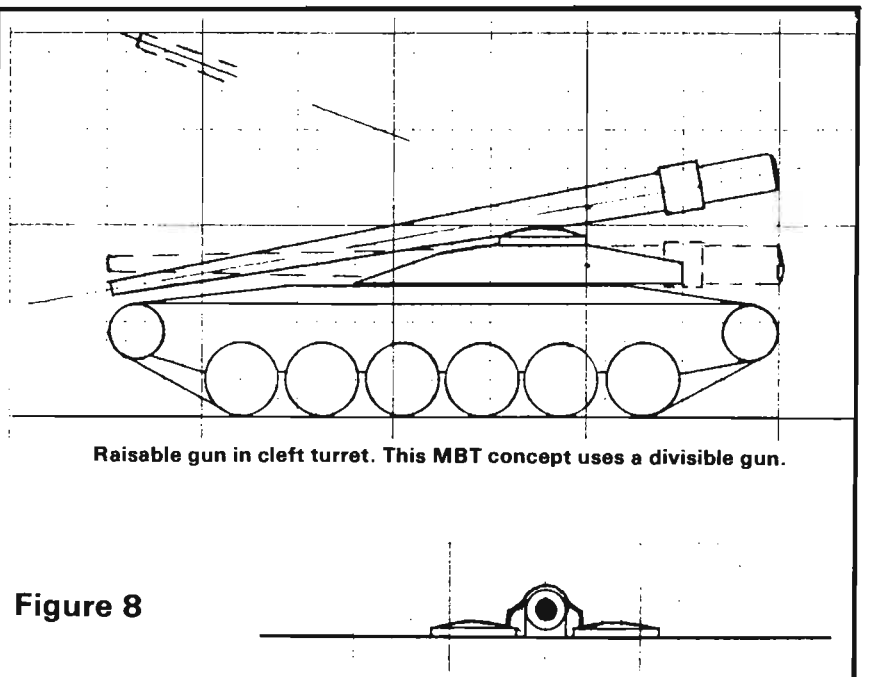
track on ground to within normal limits and also to leave adequate depression and elevation about the trunnions to allow for gun stabilization. This type of cleft turret design would retain top vision and allow hand-loading of rounds, base first, out of the rear of the turret. Moreover, it would do so with a reduction in the present 10-inch height penalty and in the overall height of the vehicle (Figure 7).

It would, of course, be possible to continue this process to the ultimate, so as to create a vehicle in which the gun would lie close above the turret ring in a very low turret. This turret would provide no depression or elevation. The gun would be depressed and elevated by means of a controllable suspension system and an active suspension might eventually be introduced to provide for the stabilization of the hull, the gun, the crew and their vision devices.[36] Unlike the UDES-17 lift-and-turn mounting, which requires the crew to raise the gun before traversing, this turret, with suspension control, could traverse discreetly prior to engaging.

This somewhat theoretical configuration would be unusable if its gun were advanced forward as in a front-trunnioned turret because the muzzle would then hit the ground during cross-country movement. But if the gun were moved back, there would be no overhang and the vehicle could move cross-country without any restriction.

An alternative is to adopt a gun mounting system similar to that of the American Elevated Kinetic Energy Weapon (ELKE) test bed, in which an ARES 75-mm automatic cannon is carried above the turret ring of a Sheridan hull.[37] This ELKE vehicle can be considered as carrying its gun upon front trunnions and then lifting those trunnions on arms pivoted close to the rear of the ring. It should be noted that in this particular test vehicle, the gun is not actually able to descend to below the level of the surveillance vision devices. Therefore, the design sacrifices top vision.

By rearranging the ELKE configuration — and in particular by moving from front to rear trunnions — it is possible to imagine the gun carried on arms, or on a single central arm, pivoted just behind the front of the ring. If this raisable gun mounting is then placed in the central cleft of a very low cleft turret, the gun can be carried lowered below crew vision devices and lie low across the top of the ring. The raising mechanism can then be activated to raise it to above the level of the vision devices, to restore its ability to depress, to elevate, and to allow it to fire. This raisable gun configuration preserves direct top vision until the instant that the gun is raised up to open fire. The design allows the turret to be traversed slowly with the gun held in its lowered position before being raised up to start the engagement. In its lowered position, the gun will lie centrally and symmetrically close to the top of the hull, giving a turret height which will be no greater than that of a front-trunnion flat turret, and a low overall vehicle height (Figure 8).



Raisable gun in cleft turret. This MBT concept uses a divisible gun.

Figure 8

View of turret at full depression over crest.

This combination of a raisable gun in a rear trunnion cleft turret will allow the MBT to engage immediately whatever has been observed through its vision devices and gives it tactical advantages which are quite outstanding. A vehicle so equipped will not have to move forward and rearward when engaging over a crestline, but will remain in a turret-down position with only its vision devices exposed, then raise its gun, fire a shot and lower it again. The target exposed will be no larger than that displayed by an overhead gun, but the *time* of exposure will be significantly shortened. Since the gun will normally be carried — and reloading will take place — with the gun at or close to its fully-lowered position, a raisable gun will not suffer from the prominence of the permanently-raised overhead gun and the protection provided for it will be increased.[38]

It has been suggested that a raisable gun might be inaccurate due to play which might develop in its gun-raising linkage, but that is not in fact correct. Accuracy will depend only on the maintenance of the correct relationship between the gun — or, more particularly, its muzzle — and the gunsight mounted on the cradle which will then be observed remotely by the gunner. In the case of a cleft turret with the crewmen traversing round with the gun, this remote viewing can be by means of hard optics, as in the Improved TOW Vehicle and in the ELKE test bed, giving the best possible resolution. If the crewmen are not to traverse, as for instance in the UDES-17 configuration, television might have to be used, possibly with some loss of resolution, but with no degradation in the accuracy of gun laying.

Future Gun Mountings

Selection of the most suitable method of gun mounting will be very much a matter of opinion and will eventually be decided by crewmen's perceptions of how future direct-fire engagements are likely to be fought. So far, the only limita-

tion to have been imposed is the crew's need for surveillance vision. Because of problems of field of view and orientation when such vision must be exercised indirectly, it is unlikely that overhead gun configurations — the American TTB, German VT S-1, Swedish UDES-19 and the French MARS turret — will be adopted for use in the MBT.

Should a solution to indirect surveillance vision eventually be discovered, then criticism of the overhead gun will be transferred to its other problems, such as its prominence, its vulnerability and its remote reloading. Compared to the raisable gun, the overhead gun will still have to move forward and rearward to engage over a crestline and its time of exposure will be much greater. In contrast, the raisable gun will be protected by the turret while it is lowered for reloading and will only be exposed when it is raised to be fired. Thus, even if its vision problems are eventually solved, the overhead gun will not necessarily be selected as the successor to the conventional turret. Its position will be challenged by —and should logically be conceded to — some form of raisable gun.

The first series of mountings which might be selected for use by the main battle tank are those which can be described as being of the casemate type. Elevation, depression, and some degree of limited traverse might be included and the breech of the gun might be outside the armor at the vehicle's rear. Such vehicles would still have to move forward and rearward to engage over a crestline and would present targets which might be low but could also be quite wide. The attraction of this group of vehicles lies in the comparative simplicity of their construction and in their compactness. Although traverse would remain restricted, this group merits careful attention and may be about to receive renewed study as opinion hardens against the conventionally turreted tank.

The UDES-17 type lift-and-turn mounting, although of the same origin, creates a new category of its own by using a raisable gun mounting to achieve all-round traverse while its crewmen remain seated in the hull. It is probable that ready rounds would be carried in the gun mounting to allow the gun, once raised and traversed, to continue firing until the target had been destroyed. The gun will form a small target when firing over a crestline, but its time of exposure will, of necessity, be longer than that of the ring-mounted raisable gun.

The second series of mountings which might be selected is that based on the gun-above-ring cleft turret, with its height reduced either by inclination of the suspension or by the use of a raisable gun. Suspension inclination and the raising and lowering of the gun can thus be seen as two alternative methods available to lower the gun relative to the ring, and in the wider context, to lower it relative to the top run of the vehicle's tracks.

Although suspension inclination can reduce both turret and vehicle height, it can do little to reduce the size of the target presented when engaging over a crestline or to remove the necessity for the vehicle to move forward and rearward in action. If the vehicle could also be raised and lowered on its suspension, it could more easily be concealed, but if this ability were then to be deliberately employed to facilitate engagement over a crest, the operation might be only slowly performed and the size of target exposed would still remain large. Although total transfer of depression and elevation to the suspension system is certainly possible, and has already been discussed, it is more likely to be limited to some intermediate amount.

Some Real-World Examples

The Swedish "S" Tank, a 1960s design, exemplifies one type of casemate configuration, with the main gun fixed within the hull.

The Teledyne Armored Gun System proposal places crew in the hull beneath a gun which presents a very small target when fired from behind cover.

Shown being tested here on a Sheridan chassis, the Elevated Kinetic Energy Weapon (ELKE) features gun trunnions that go up on pivoting arms mounted at the turret rear.

If, alternatively, the decision is taken to adopt a raisable gun mounting, there will be no point in introducing it to a limited extent. The gun must be lifted from below the crew's vision devices to above them in one rapid movement so that direct all-round surveillance vision can be exercised in either case. Intermediate positions, giving reduced depression and elevation, could be used when firing in open country, but the full extent of gun raising would remain available and would be employed for stabilized fire on the move. A raisable gun mounting will create a gun-above-ring cleft turret of minimum height and the overall height of the vehicle can be reduced subject only to the provision of adequate volume within the hull. Compared to a vehicle employing suspension control, the size of target when engaging over a crestline will be reduced, the time of exposure will be much less and no vehicle movement will be required.

Although consideration of these various gun mountings has so far been in terms of the MBT, they can equally well be applied to the MPGS — now the Armored Gun System. The advantages of a front-engined vehicle with its gun drawn back above its hull can be realized in place of the muzzle-forward projection of rear-engined vehicles using front-trunnioned turrets. It is claimed that the recently announced Teledyne Armored Gun System with an Overhead Gun on a front-engined hull has about the same chances of survival as the heavily armored M1 Abrams tank when in a hull-down position because of the much smaller target which it will present.[39] It would be reasonable to assume that an AGS which was built to carry a raisable gun would be even better as the small target would only be exposed for a very limited time.

In the case of an IFV-type vehicle, the cannon turret must often be raised on a spacer ring in order to give the angle of depression which is required.[40] Adoption of a raisable mounting will allow the cannon to be carried close above the roof of the hull in a cleft turret of minimum height and then to be raised to achieve depression when required to open fire.

To allow these selected gun mountings to be constructed, development programs for a new gun system, automatic loading, suspension control and gun raising will have to be initiated. But a major effort will also need to be directed to the development of a front-engined hull to allow the tank gun to be moved rearward, not only over the ring, but also with respect to the top run of the vehicle's tracks. The creation of such gun-above-hull tanks will be the subject of my concluding article in the next issue of *ARMOR*.

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ROBIN FLETCHER was commissioned in the Westminster Dragoons in 1941 and later served in the Special Operations Executive and 2d Special Air Service Regiment. After the war, he attended the technical staff officer's course at Shrivenham, spent two years on tank design at Chobham, and returned to Shrivenham to lecture on tank armament. After leaving the service, he raised crops in Kenya and cattle in Ireland. His articles on armor have been published in *International Defense Review, Soldat und Technik, TANK,* and other journals.

At Texas A&M, Cavalry Is More Than a State of Mind

by Captain Edwin L. Kennedy, Jr.

"Fours left about, ho!"

The horse cavalry is alive and well at Texas A & M University. The last of the four-year senior ROTC cavalry programs in the nation, the horse cavalry troop is part of the Texas A & M Corps of Cadets.

Originally formed in 1919 at Texas A & M as part of the program to commmission Reserve officers into the Cavalry branch, horse drawn artillery instruction was later added. The horse cavalry flourished at A & M from 1919 until the demise of the horse cavalry in the Army in 1943, when A & M was required to disband its cavalry units.

The cavalry program at A & M commissioned a large number of Reserve officers, many who later served in World War II.

Thirty years passed without the sound of hooves on pavement, the creak of leather and the smell of horse sweat, but in 1973, some men with a love of tradition and imagination helped reorganize a mounted unit at Texas A & M.

The cavalry troop was formed by a group of interested senior cadets who saw the chance to field a highly visible unit that would promote the school and Corps of Cadets. Since the Army no longer used horses, other than in ceremonial units, the means to mount and equip the unit were left to the cadets. A former armor officer and ardent rider, Jack Fritz, came to their assistance. Now vice-president of the United States Equestrian Team, Fritz purchased some of the original tack and the saddles used by the troop, and donated much of his time to help train the cadets in military equitation. The remainder of the equipment used by the cadets was purchased through an alumni organization, or by the cadets themselves.

Initially, the unit was stabled at an old Army Air Corps installation outside of town, but it is now located just outside the main campus. The barn was erected by the cadets in their spare time and the University provided a stable office and tack room.

The cadets pay for the upkeep of their horses and must obtain their

Texas A&M cadet troop includes a horse artillery half-section. Its 3-inch Model 1902 field gun was found buried on campus and was refurbished by troop members.

Horse artillery half-section is seen en-route to a campus ceremony drawing field gun and limber.

own mounts, either by borrowing or purchasing them. The university partially subsidizes the unit with funds to maintain equipment and to care for a small number of horses which have been donated.

The troop's saddles are English forward seat saddles similar to the officer's Model 1936 Phillips saddle. The bridles are the Model 1909 single bridle with snaffle bit. The horses of the artillery half-section are equipped with original harness and McClellan artillery saddles.

The cadets in the troop wear the same uniform as the Corps of Cadets with minor changes. The junior cadets wear the Model 1917 canvas and leather mounted leggings while all seniors wear the officer's brown dress boots. The cadets in the cavalry troop also wear the same patches worn by cadets during the 1930s and 1940s.

The uniform worn during hot weather consists of the officer's dark green dress shirt and the Model 1912 campaign hat.

The troop is organized into a headquarters section, two cavalry platoons and a horse drawn artillery half-section, a relatively new addition. The half-section pulls a Model 1902, 3-inch field gun and limber, the gun found buried on university land several years ago and refurbished. (The Model 1902 field gun was declared obsolete after WWI when it was replaced by the French '75.) The field gun unit fires salutes at ceremonies and football games on campus, and has been invited to parades and ceremonies in the area.

Cadet cavalry troopers must provide their own mounts and spend much of their time — like their forebears — on stable call. The barn was also built by the cadets.

CAPTAIN EDWIN L. KENNEDY, JR., graduated from USMA in 1976 and served as commander, Company C, 1-18th Infantry (Mech), 1st Infantry Division. He is a graduate of the Army Infantry Officer Advanced Course and the Armor Advanced Course. He also graduated from the Israeli Armored Corps Commander's Course (equivalent to the USA Armor Officer Advanced Course) and from CAS3. He served as an antitank platoon leader, S3 (Air), instructor at the Infantry School in tactics, as project officer, Infantry Doctrine Branch, Infantry School, and as an instructor in the Senior ROTC Program. He has been an active rider for 9 years and has five years' competitive show riding to his credit. He is the Riding Master for the Cadet Cavalry Troop at Texas A&M and instructs the cadets in horsemanship and horsemastership.

The Symbol of Armor

Armor, the combined arms force, is the spearhead of the attack, and the shoulder patch worn by its members proudly reflects that battle role. The three-colored triangle patch, with its superimposed track, gun, and lightning bolt, says it all.

The triangle is an ancient heraldic armoral design known as a "pile", literally, a spearhead. The three colors represent the combined arms and Armor's basic elements — blue for infantry, red for artillery, and yellow for cavalry.

Superimposed in black upon the tricolor triangle are the representations of Armor's prime assets: mobility, firepower, and shock. The track symbolizes mobility; the cannon shows firepower; and the lightning bolt represents shock. These are the assets and the functions of Armor, the combat arm of decision.

The Tank Corps of the American Expeditionary Force was formed in France in January 1918, and Colonel S. D. Rockenbach was its chief. Rockenbach understood that the newly founded corps needed an insignia, something that its members could wear with pride to show who they were and what they did on the battlefield — much the same as the infantry's divisional shoulder patches. He assigned Lieutenant Wharton, a member of his staff, the responsibility of designing a suitable insignia for the fledgling corps.

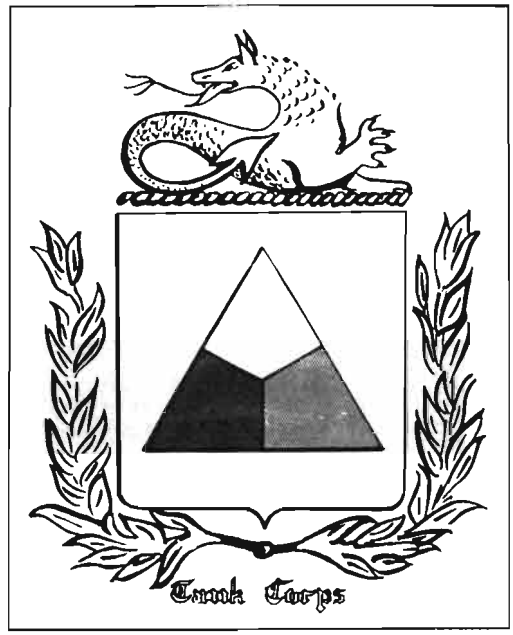
The lieutenant followed accepted heraldic armorial practices when he designed the Tank Corps' insignia. He used a silver shield *for the background and superimposed upon it the* charge *(a three-colored triangle) and added a silver dragon (the* charge *on the coat-of-arms of the 1st Cavalry) as the* crest *above the* shield. *The laurel leaves represented valor on the battlefield and were an ancient symbol of military prowess.*

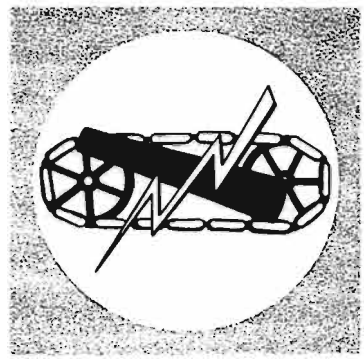
It was not until 1940, however, that the present Armor shoulder patch evolved. In that year, the Armored Force was formed with Major General Adna R. Chaffee as its chief, and the shoulder patch of the 7th Cavalry Brigade (Mechanized) was combined with the Tank Corps patch to make today's Armor insignia.

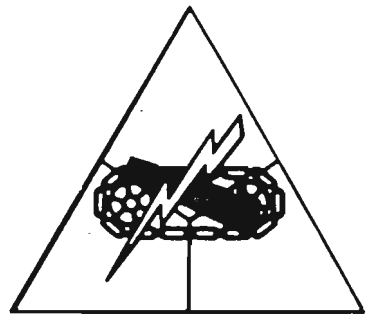
The 7th Cavalry Brigade (Mechanized) had been specifically formed to train for mechanized warfare. Its parent units had been the 1st Cavalry Regiment, the 13th Cavalry Regiment, and the 68th Field Artillery Regiment. PFC Linthwaite (later colonel) and Major Robert W. Grow (later major general) had designed the 7th Cavalry Brigade's patch, and Colonel Van Voorhis (later general) authorized its superimposition on the Tank Corps' patch.

The amalgamation of the Tank Corps' patch with the 7th Cavalry Brigade's patch resulted in today's Armor Force shoulder patch and cemented the link between the new and the old in Armor.

Later, the function of the shield *of the Tank Corps' patch that had once borne the* charge *(the triangle) was taken over by the* charge *itself, and the* shield *was deleted. The present-day patch was approved by the War Department in November 1940.*







This successful union of three separate combat arms into a single viable strike force is visible proof of the efficacy of American combined arms and their commitment to success on the battlefield.

Mobility, firepower, and shock. Cavalry, artillery, and infantry. Armor.

Forge the Thunderbolt!

Leadership and Technology

General Donn A. Starry (Ret.)

The following excerpts are from a speech delivered by General Starry at the Armor Conference Banquet.

Tonight, I'd like to ask you to consider with me leadership — leadership in a somewhat different context than perhaps anyone has asked you to think about it before. Leadership and technology! Everywhere we go today, when things go wrong, it's the "computer" that screwed up. It's the computer — the technological solution, that didn't accomplish this or that. No human being is responsible for failure any more. Well now, just who is responsible? Who is in charge — are we — or is the technology!

We are on the leading edge of some of the most exciting technology the human mind can imagine. But, on the back end of that is the usual gathering of normal guys trying to cope with it all. So how should we think about this problem?

It is important to remember that in WWII we overwhelmed the enemy with numbers. The enemy, in fact, enjoyed a considerable technical advantage — for example the jet airplane, the Zero, the V2 ballistic missile, the Japanese torpedoes. It took us two years to overcome some of those problems, and in the main, we did it with a little technology and a lot of numbers. Following WW II, unwilling to pay the price for large standing conventional forces, we adopted the idea that we would substitute our then clear cut technical advantage for numbers; that technology in the form of nuclear weapons would take the place of numbers of tanks, airplanes, divisions.

That solution has been overtaken by time and circumstance. We now find ourselves in a situation in which the Soviets enjoy tactical, operational and strategic nuclear parity or superiority, depending on who adds up the numbers; and they continue their conventional force superiority. The question remains. Can we fight outnumbered and win below the nuclear threshold?

The answer is yes, if we know what we're about. But how do we do it? Who is responsible for it; what roles does technology play?

Operational concepts come first. We can't afford the luxury of letting the technocrats develop something the combat guys have to figure out how to use sooner or later. The operational concepts comes first and must drive the technology.

Who is responsible for operational concepts? The leadership! If the leadership is not willing to stand up and say, "Here's where we are, here's where we want to be, here's how we're going to get there," nothing useful will ever happen.

Technology has a role: technology provides the means. The Strategic Defense Initiative (SDI), for example, is essentially a concept to stand down the Soviet offensive intercontinental ballistic missile nuclear threat. The technologists have been tasked to describe a feasible solution. At the conventional level, AirLand Battle is the same thing. It says, we have to render obsolete the Soviet operational concept of mass, momentum, and continuous land combat. How we do that is fight the close-in battle at the FLOT by thickening and deepening the antitank defenses there, and attack deep into the follow-on forces at the same time. It's the combination of those two actions that is AirLand Battle. It's a concept that stands down Soviet conventional numerical superiority without having to invoke the nuclear threat at the operational or the tactical levels of war.

Now operational concepts require a lot of supporting effort — doctrine, force structure, organization, training.

Let's highlight some of those — let's take equipment requirements, organizational requirements, and soldier requirements. With regard to armor equipment needs, we clearly can't wait for 1995 to write the 1996 requirements. Armored warfare of the future is maneuver warfare. We'll need a family of vehicles — tanks, infantry vehicles, artillery vehicles, tank recovery vehicles, bridges, ammo vehicles, resupply vehicles. The whole family of vehicles must be developed in the context of how we will conduct maneuver warfare. For the purpose of maneuver warfare is to get into the enemy's "interstices," his guts, where it hurts. We need to develop the equipment for that — now!

Now, how do we organize to do that? We need a whole lot of smaller units. Three-tank platoons, three-platoon companies, three-company battalions, and three-battalion brigades because we need more leaders for those who are led. This may mean 15 battalions per division. Small battalions commanded by mean SOBs who have nothing but a microphone and tank to run them. No mains, rears, TACS, staffs; the prime order of business is to kill a whole lot of the enemy.

One problem with more smaller organizations is command control. The commander really only needs to know a few things — where is he, what is he doing, who's opposed to him, how's the fight going, and what ought he be doing next. It has nothing to do with computerized systems. It has to do with what people know about what they are doing, and about where the enemy is and what he is doing. To the extent that we clutter up that world with "computers that make all the mistakes" we may be doing exactly the wrong thing! Think about that! And do something about it!

Now, what about the soldier problem — the manpower, not the personnel problem.

We cannot have a 16-division Army on a 785,000 manpower base, and have good units, unless we do

something to insure personnel stability in those units. The last time we had 16 divisions in the Army, we had 986,000 people. You can't have that much structure, and more besides, on today's lean end strength and not have a hollow Army. For example, we know that if we exceed the 20% turbulence rate per quarter, meaningful training doesn't get done. Yet we have an Army that's accepting, in many cases, twice that turbulence rate! With rates that high, we can't hope to provide the effective force we're trying to build. Yet the overstructure-understrength mismatch virtually insures our inability to build an effective force. Think about that. And do something about it!

So, the challenge lies in the operational concepts, the doctrine, organization, equipment, training, — all the things that put trained soldiers in the right kinds of units with the right equipment, and leaves them there long enough to learn the right kinds of tactical skills to sustain themselves in combat.

Who is responsible for that? The leadership!

What is the role of technology? If technology has a role, it is because leaders take charge of it and tell it what to do. Let go on its own, technology will run organizations — develop force structure, equipment, tactics and training in directions never dreamed of. The responsibility of leadership is to take hold of technology, not to be its servant. Knowing the computer will inevitably go out, and just at the wrong time, some one has to know how to solve the problem —likely without the computer.

We've come a long way since the 1970s. When you see the M1A1 roll by, you have to feel good about that. But it was the leadership that took the technology and said, "Here's where we are, here's where we need to be, and here's how to get there," that made that tank possible. It did not just "happen." That's the kind of leadership we've got to have. You are the leaders — that's your challenge.

NCOs Are Part of Combined Arms Team

Nearly 40 years ago, then Lieutenant Colonel (later General, and Chief of Staff) Creighton Abrams wrote an article for *ARMOR's* predecessor, the *Armored Cavalry Journal,* called "Armor in the Team." In that article, he wrote that teamwork is "...the weapon upon which the future of the Army depends."

At the company commander and battalion commander level, the Army does a fairly good job of teaching and training as a team. We send infantry officers to the Armor Advanced Course and Armor officers to the Infantry Advanced Course. Armor and Infantry majors and lieutenant colonels at the Command and General Staff College work closely together for nearly a year. When the tank company goes to the field, it nearly always goes as a tank-infantry team. When the tank battalion goes to the field, it nearly always goes as a tank-infantry task force.

But what are we doing to ensure that this concept of combined arms teamwork permeates the noncommissioned officer corps?

If we truly believe that the lethality of the next battlefield will force most leaders to move to command at two levels up, then we must accept the possibility of platoon sergeants serving as company team commanders for periods of time. Yet all of their training, as it now stands, points toward leading armor- or infantry-pure platoons. Even if we choose to disregard this potential battlefield situation — and that would be a dangerous choice — we have to accept the fact that many of today's staff sergeants and sergeants first class will eventually become first sergeants of company teams, and some will become command sergeants major of battalion task forces. What can we do to give these noncommissioned officers the education and training that they will need to ensure that their *teams* work?

First, I propose that the Army modify its Infantry and Armor NCO Advanced Courses to ensure that there are classes in the tactical, logistical, and technical aspects of each of these two combat arms.

Second, I suggest that selected NCO Advanced Course graduates be sent to the other branch's Advanced Course, much as is done with the lieutenants and captains of the Armor and Infantry branches.

Finally, I propose that when a noncommissioned officer attends the First Sergeant and Sergeant Major Academy, we ensure that he receives adequate instruction in leading soldiers effectively in a combined arms environment.

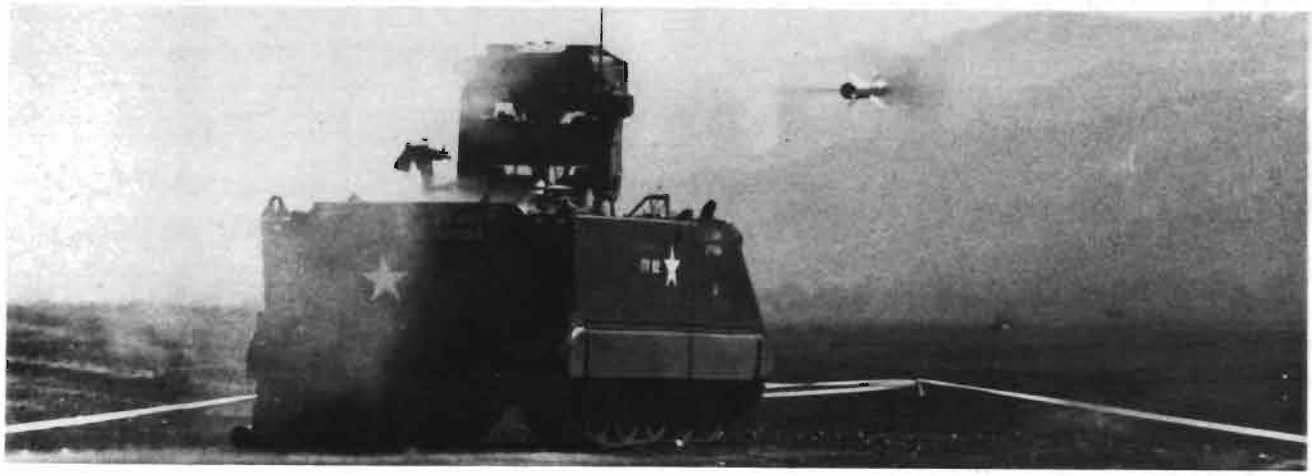
Let's begin to make sure that *teamwork* permeates every level of leadership. A normal career progression will put today's Armor or Cavalry staff sergeant and sergeant first class into leadership positions that demand he have the knowledge and skills to lead combined arms organizations. The modern, integrated battlefield will do the same. As an Army, we owe these noncommissioned officers the best educational opportunities we can give them to make them successful leaders and to ensure that teamwork remains — as General Abrams said — "...the weapon upon which the future of the Army depends."

WILLIAM J. WILLINGHAM
SSG, Infantry
Fort Knox, KY.

Bradley Battalions Need Tanks, Not ITVs

The mission of the Division 86 tank company in a Bradley Fighting Vehicle (BFV)-equipped battalion would be better accomplished with a tank company instead of an Improved TOW Vehicle (ITV) company. Initially, the tanks could be M60A3s, although they should be replaced with M1s as quickly as possible.

The ITV is clearly an inadequate vehicle in a BFV battalion:



- ITVs are superfluous in a battalion in which each squad carrier is equipped with a TOW missile system and 25-mm cannon.
- The ITV is not capable of maintaining the same speed as the BFV.
- The ITV crew is not as well-protected as the BFV crew.
- ITVs are not suitable for overwatch in the offense. The rate of fire is too slow; the time of missile flight is long; and the antipersonnel effect of the weapon is minimal compared to that of a tank.

Replacing the AT company with a tank company would provide the following advantages:

- Provide organic, rapid, accurate, and long-range fires on the enemy.
- Increase the combined arms consciousness of the infantry battalions and reflect how we fight — as a combined arms team.
- Increase the combat power of the AT company by as much as four to nine times (based on 14 M60A3 or M1A1 tanks and using calculations found in *Numbers, Prediction, and War,* (Hero Books, Fairfax, VA.) by Colonel (Ret.) T. N. DuPuy).
- Reduce the number of soldiers slightly in an infantry battalion.
- Allow divisions to concentrate their tank battalions for attack and counterattack.
- Assist the infantry in gunnery training.

Such a change in organization would reduce the AT company from 69 soldiers to 62. This would mean a reduction of 35 soldiers across a division. This saving in infantrymen could be used to fill slots in the light infantry division or to allot one ITV to a M113-equipped mechanized infantry platoon, significantly increasing its combat power against tanks.

If a tank company is substituted for the antitank company in the mechanized infantry battalion, operational security would be improved because now the enemy could not identify the unit as a mechanized battalion since there would be a low density of ITVs.

Tank companies permanently assigned to infantry battalions would clearly provide many advantages, especially in mobility and fire power. The Army was judged "not ready" for combined arms battalions in 1980 (*ARMOR* Magazine, November-December 1980, p. 32). I submit now, six years later, it is ready, and the need is pressing to increase combat power in the face of stringent manpower limitations and ever-increasing Soviet land power.

MICHAEL K. ROBEL
Captain, Armor
FRG

Recognition Quiz Answers

1. **AT-T Heavy Tracked Artillery Tractor (USSR).** Crew, 4; maximum load, 25,000 kg; maximum speed, 35 km/hr; maximum range, 700 km; V-12 415-hp diesel engine. Shown equipped with BTM ditching machine: Crew, 2; capable of digging 1,120 meters of 1.5-meter-deep ditch per hour.

2. **LEOPARD II (FRG).** Crew, 4; combat weight, 55,150 kg; maximum road speed, 72 km/hr; maximum road range, 550 km; 12-cylinder, multi-fuel 1,500-hp turbo-charged engine; armament, 1 x 120-mm smoothbore main gun; 1 x 7.62-mm coaxial machine gun, 1 x 7.62-mm AA machine gun.

3. **M113 APC (FRG).** Crew, 2 + 11 infantry; combat weight, 10,258 kg; maximum speed (road), 64 km/hr, (water) 5.6 km/hr; maximum road range, 321 km; V-8 gasoline 209-hp engine; armament, 1 x 12.7-mm machine gun; armor, 12 to 38-mm aluminum.

4. **T-62 MBT (USSR).** Crew, 4; combat weight, 40,000 kg; maximum road speed, 50 km/hr; maximum road range, 450 km — 650 km w/added fuel tanks; V-12 diesel 580-hp engine; armament, 1 x 115-mm main gun, 1 x 7.62-mm coaxial machine gun, 1 x 12.7-mm AA machine gun; maximum armor, 100-mm at 60-degree slope on front glacis.

5. **PIRANHA APC (Can).** Crew, 14 maximum; 6 x 6 wheel drive; combat weight, 10,500 kg; maximum speed (road) 100 km/hr, (water) 10.5 km/hr; maximum road range, 600 km; Detroit Diesel 300-hp engine; armament, varies. Shown with 20-mm main gun.

6. **M60 AVLB (USA).** Crew, 2; weight (w/o bridge, as shown) 41,730 kg; chassis length, 8.648 meters; chassis width, 3.64 meters; maximum road speed (w/o bridge), 48 km/hr; Continental 12-cylinder diesel 750-bhp engine; armament, nil; maximum armor, (front) 101-120-mm.

REGIMENTAL REVIEW

An M1 IP of the 33d Armor guns it out at Grafenwoehr.

33d Armor Hot Shots

The 1st and 3d Battalions, 33d Armor, 2d Brigade, 3d Armored Division, were the first USAREUR units to receive the new M1 IP main battle tanks and promptly set new gunnery qualifying scores on Tank Table VIII at Grafenwoehr.

The 3d Battalion was the first Spearhead Division unit to get the new M1 IP (Improved Product) tanks and in two weeks at Grafenwoehr set new USAREUR records by qualifying 14 of 38 tanks during first time round qualification on TT VIII with a total score of 10,881, or an average of just over 777 per tank of a possible 1,000 points.

The 1st Battalion was the next Spearhead unit to receive the new tanks, and they proceeded to beat the 3d's records when they fired an average of just over 807 points of a possible 1,000 per tank and qualified 27 tanks out of 52 during the first round qualifications.

First Lieutenant Michael G. Devereaux, Co D, 1st Bn, 33d Armor, commander of the tank that scored a USAREUR high of 956 points (out of 1,000) on TT VIII said, "The battalion average would have been higher, but the weather was not on our side and safety restrictions precluded all of our tanks from completing their day and night runs."

The "Men of War" of the 3d Battalion were rated the best firing battalion within the 3d Armored Division during 1984 and commented, "Could we be expected to do less?"

MSG Henry A. McBride, 3d Battalion master gunner, said, "The soldiers think that the M1 IP is the best thing since sliced bread....This tank will do things that tankers have only dreamed of, in any kind of weather, anywhere, anytime...."

SSG Richard A. Bleakley, 1st Battalion master gunner, said, "The soldiers like the improved technology of the M1 IP that includes better computerized systems, a better firing platform and better stabilization....Our wives call it our new toy," he added, "But opposing forces will quickly dub it something else."

In addition to being the high M1 IP battalion in USAREUR and having high tank in USAREUR, the 3d Battalion of the "Men of War" also now hold the record for high company with a high average of 838.9 and high platoon with an average of 845.

Good Shooting!

Pendleton Cavalry Troop Rides Off With Award

Their "mounts" weight 57 tons and burn gas instead of hay. Their uniforms are camouflage. Their lines stretch seven miles across high desert plains. Their bugles are static filled radios crackling out orders from higher command.

Much has changed in the Cavalry since the bravado of Custer, but one thing remains unchanged — the cavalry soldier's dedication to excellence.

The Oregon Army National Guard soldiers of Pendleton's I Troop (-) 3rd Squadron, 116th Armored Cavalry, are proud to follow in the hoofprints of their predecessors. I Troop's sister units of the 3rd Squadron, headquartered in La Grande, are located in Milton-Freewater, Baker, Ontario, Burns, Bend, Redmond, and The Dalles.

I Troop works hard maintaining an enviable standard of excellence. This year their dedication earned the unit the coveted Goodrich Riding Trophy.

The award is presented annually to the best armored cavalry unit within the five state area of Oregon, California, Washington, Idaho, and Montana. Established in 1924, the trophy is given for excellence in leadership of small cavalry units. The charging trooper topping the trophy reflects the proud traditions of cavalry units.

To win the award, a cavalry unit must display sustained excellence for the entire training year — especially in the areas of weapons qualification, field maneuvers, drill attendance, and leadership.

"We were surprised, happy at the announcement," says Captain Scott McCrae, I Troop (-) commander for training year 1984. "This is our first Goodrich award. I knew we stood a good chance of winning," he continued, "Someone would have had to do really well to beat us. We trained hard."

"We went back to the basics," says McCrae, "keeping things simple, standardizing and using the chain-of-command."

"We emphasized Standing Operation Procedures (SOP) during every training exercise," said McCrae. "We also worked on building a strong chain-of-command," McCrae continued.

Adapter Kit Adds Mine-Clearing Roller to M1

General Dynamics Land Systems Division, Warren, MI, has received a $1.5-million contract from U.S. Army's Troop Support Command at Ft. Belvoir, VA, to develop and test an adapter kit that will allow the Army's recently-fielded track-width mine clearing roller to be mounted on the M1 Abrams MBT.

The roller weighs nine tons and consists of two wheel assemblies that are mounted in front of the tank's tracks to clear pressure fuzed mines. A weight drag on a chain between the assemblies will clear tilt rod mines.

The adapter kit attaches to the tank's bow towing eyes and allows the crew to mount the roller on an unmodified tank in the field, but is arranged so that the driver can disconnect the roller from inside the tank in about 15 seconds. The tank can then continue its mission without the roller once the minefield has been cleared.

Armor Branch Notes

The Combined Arms and Services Staff School (CAS^3) will reach a full operating level of 4,500 students annually in FY87. This will provide the opportunity for all Armor captains in Year Group 79 and later to attend the Phase II, the 9-week resident portion at Fort Leavenworth. A captain must be an advanced course graduate prior to enrollment in Phase I, the non-resident correspondence block. Phase I must be completed prior to attendance at the resident phase. Phase II must be completed prior to completion of the ninth year of active federal commissioned service.

Advanced course graduates, Year Group 79 or later, who have not previously enrolled may do so by calling AUTOVON 552-5407/2042 or by submitting a letter including name, SSN, branch, month/year graduated AOAC, year group, and mailing address to:

Commandant
USACGSC
ATTN: ATZL-SWE-TM
Fort Leavenworth, KS 66027-6940

Armor officers will attend Phase II either on TDY enroute to a PCS or on TDY and return to their current duty station. Depending on the attendance status, officers should arrive at Fort Leavenworth with a copy of their ORB, copy of DA Form 2, medical and dental records, 201 file, finance record, and Phase I Completion Certificate.

CAS^3 has received many accolades as an excellent course of instruction, and armor commanders at all levels must encourage timely completion of Phase I.

39th First Cav Div Reunion Set

The 1st Cavalry Division Association will hold its 39th annual reunion at the Riviera Hotel, Las Vegas, NV, on August 7-10.

For additional information write to: Bob Little, Executive Director, 302 N. Main, Copperas Cove, TX 76522-1799 or phone (817) 547-6537.

Who's Who at MILPERCEN's Armor Branch

Phones:
AUTOVON 221-6340, 6341, 9696, 9658
Commerical (202) 325-6340, 6341, 9696, 9658

LTC Thomas Smith
Armor Branch Chief

CPT(P) Montague (Que) Winfield
LT/CPT (OAC) Asgmts

CPT(P) Guy C. Swan III
CPT Functional Area Asgmts

CPT Kevin C.M. Benson
CPT Nominative Asgmts

MAJ William A. Reese
MAJ Asgmts

LTC Bobby Lum Ho
LTC Asgmts

Mrs. Gloria Johnson
LTC Asgmts Tech
(Photo not available)

Mrs. Susie Shannon
Accessions/LT Asgmts Tech

Mrs. Sharrmaine Chittams
Assistant, CPT Asgmts Tech

Mrs. Dorothy Groome
OAC Asgmts Tech

BOOKS

STEEL STEEDS CHRISTIE: by J. Edward Christie. Sunflower University Press, Manhattan, KS. 1985. 86 pages, softbound. $15.95.

Armor buffs, military historians, and a multitude of others have been waiting many years for a definitive work on the life and armored vehicle developments of J. Walter Christie. They will have to continue to wait, as this is not it. Written by his son, J. Edward Christie, it is an emotional rendering of remembrances of life with J. Walter Christie as he attempted to promote his various vehicles — sometimes by ordinary and occasionally by rather overwhelming means. The personal remembrances are filled out by research into the times and events in which the son did not participate, such as the work on the early racing cars, automobiles, and fire engine conversions. While the book contains some rather unusual quotations by some well known personalities, the portions having to do with military vehicles have too numerous technical and historical errors.

Note need be taken of only a couple, since to cover them all would require another book. On page 20, the statement is made that the Model 1919 Christie Tank (called the M-1917-19 Tank in the book) was unveiled at Aberdeen Proving Ground in November, 1919. True, there *was* a Christie vehicle at Aberdeen in November, 1919 — the pilot model of the first Christie Self-Propelled Mount for the 155-mm Gun, which was demonstrated there in that month for the Chief of Artillery. However, the contract for the design of the Model 1919 Christie Tank was prepared November 28, 1919, and the tank arrived at Aberdeen for official testing on February 5, 1921. Testing was suspended on April 21 at Christie's request as it was impossible to further operate the tank without serious damage resulting. Before it returned to Aberdeen, it would be extensively modified into the Model 1921 Tank.

Also on page 20, the author offers a tale on the supposed initial firing of the Christie Self-Propelled Mount for the 155-mm Gun, which he indicates as occuring in the same month, November, 1919, that the tank was supposedly unveiled. The gun mount actually arrived at Aberdeen on July 11, 1919, was driven to the firing range, and fired its initial rounds on July 12, 1919. The testing team, which probably was involved in the demonstration for the Chief of Artillery, took station under cover — most likely because the ammunition being fired was not considered bore safe — a standard precaution of this and other times.

The many illustrations are, in the main good. Most have been previously published. Even so, numerous illustrations are miscaptioned. The sketch on page 18 of the supposed truck used in the Pershing expedition is a copy, with changed wheels, of the Christie Model 1917 Anti-Aircraft Gun Mount, shown just below the sketch. They were completely different vehicles, the former having only front wheel drive with a farm wagon style rear end and about twice the ground clearance of the anti-aircraft gun mount. On pages 28 and 29, the same photograph is shown with different captions.

In summary, this memoir is indeed an interesting book to read, strongest in the early parts covering the Christie automobiles. But it should not be considered technically and historically correct as a reference on the achievements of automotive and armor pioneer J. Walter Christie. Use only with a host of other references. (British readers will not be pleased with the book, as on page 66 the author refers to General Rommel as the Desert Rat!)

LEO D. JOHNS
Colonel, USA (Ret.)
Newport News, VA.

SMALL UNIT LEADERSHIP; A Common Sense Approach, by Col. Dandridge M. Malone, USA (Ret.), Presidio Press, Novato, CA. 170 pages. $8.95 (paperback).

Here is a book to place beside your "How-To-Fight" manuals. The author condenses volumes of psychological studies into a readable and exciting book on practical military leadership. He defines leadership and management, showing how these skills are necessary at every level of the Army. After framing the "Big Picture," he focuses on the company, platoon and squad. The theme is simply stated throughout the book; small unit leaders should always be doing one of two things, "...leading soldiers and small units during battle...", or, "...preparing soldiers and small units to fight the battle..."

There is a lot of practical advice on how to prepare soldiers and small units for battle. Colonel Malone explains the necessity of making the Troop Leading Process and the five-paragraph field order more than a tool used only during ARTEPs. He says that every training day should be planned with these tools in mind. NCOs as well as officers must know and use these tools because, with constant use, organized thinking becomes second nature to all small unit leaders, thereby facilitating a key element of AirLand Battle — understanding the commander's intent.

The final chapter is a treasure trove of how-to ideas with planning, bringing smoke, and asking the right questions well covered.

This is a practical book, written by a soldier/leader for soldier/leaders. Common sense is a rare commodity, but it is abundantly evident in this book for combat leaders. To read it is to learn.

KEVIN C. M. BENSON
Captain, Armor
Armor Branch, MILPERCEN

Army History Center Prepares to Publish Official Vietnam History

The official U.S. Army history of the Vietnam War is about to be published as a multi-volume series by the Army's Center of Military History.

The series of some 20 books — to be published over a period of 10 years — will cover the Army's involvement from its early advisory years to 1973, when the American troops left Vietnam.

The series will include heavy emphasis on illustrations, maps, charts, and photographs and each book will include a comprehensive index covering personal names, military titles, geographic locations, major Army functions, and commands down to the division level.

Special books will focus on the massive logistical support of the war, its pioneering technologies, Vietnamization, intelligence, and communications. The books will be sold by the U.S. Government Printing Office. To receive timely announcements of each volume's publication (as well as notices of new military history books from all of the armed services), send your name and address to the Superintendent of Documents, Mail Stop: MK, Washington, DC, 20401, and ask to be put on Priority Announcement List N-534.

Dezinformatsia: Active Measures in Soviet Strategy, by Richard H. Shultz and Roy Godson. Pergamon Press, Washington, 1984. 210 pages with glossary and index, paperback. $12.95.

As its title suggests, this book focuses on the use of disinformation as an important element in Soviet pursuit of foreign policy and strategic objectives. "Active measures" is the Soviet term used to describe specific overt and covert techniques for influencing events and behavior in a foreign country. The authors first define the Soviet strategy and bureaucracy for conducting active measures. This is followed by a detailed analysis of Soviet overt propaganda themes over the period 1960-1980. A third major section describes Soviet covert political techniques during the same period. The final section contains inter-

views with two former Soviet bloc intelligence officers.

The principal theme of the book is that active measures still constitute a significant element in Soviet foreign policy strategy vis-a-vis the United States and its NATO allies. This premise is well-supported by the analysis of Soviet propaganda themes in *Pravda* and *New Times,* which clearly shows consistency and intensity in their negative portrayal of the United States. The author's position is further supported by the testimonies of Czech and Soviet intelligence officers, who conducted active measures operations in West Germany and Japan, respectively.

Although very readable, this book will not appeal to the general reader. It is of primary interest to journalists, who are themselves often the targets of disinformation operations. It also should be of interest to those who study in the fields of public opinion and propaganda.

JAMES F. GEBHARDT
Major, Armor
U.S. Army Russian Institute

ARMOR IN KOREA: A Pictorial History, by Jim Mesko. Squadron/Signal Publications, Inc., Carrollton, TX. 1985. 80 pages. $8.95.

This is a collection of photographs of American, Allied and some enemy tanks, self-propelled artillery and other armored fighting vehicles used in the Korean War. The photographs are well selected and portray a wide variety of vehicles. Of special interest to the modeler are the colored plates that show various vehicles in close detail. The captions are clear and precise and the unit to which the pictured vehicle belonged is usually identified. Some comment on the situation shown in the picture is also normally presented.

As the title suggests, the text is secondary to the photos. While the book is a good reference, specific armor actions and units are not covered in any depth. Usually, only two or three paragraphs cover any particular action. Tactics are not covered at all.

U.S. Marine vehicles and actions are presented in both text and photos. Substantial attention is paid to the famous "tiger" and "dragon" paint schemes on U.S. tanks.

I would recommend this book to military modelers, general interest readers, and readers interested in a collection of excellent photos of U.N. armor. There is, at best, marginal interest to those closely concerned in unit histories, or who have a detailed interest in tactics or engagements.

JACK C. THOMAS
2LT, Armor
Hershey, PA

The Order of St. George

The United States Armor Association has announced that it will begin an awards program similar to that of the Field Artillery's St. Barbara's Award.

Called The Order of St. George, the award was recently announced to the field in a letter from Armor Association President Donn Starry (General, USA-Ret.) to the commanders of Armor and Cavalry units. St. George, the famous mounted warrior of the Fourth Century, is also the patron saint of several nations and of the armored forces of Italy, France, and — within the next year or so — West Germany.

According to Armor Association Secretary-Treasurer Charles Griffiths, the development of the program and procurement of the medals (in gold, silver, and bronze) has taken nearly a year. "We hope to begin awarding the medals this summer," he said.

Editor's Note: In the next issue of ARMOR, we will have complete details of this significant and relevant new program.

Symbolism

The carnivorous tiger is symbolic of the enemy-devouring qualities of the regiment. The battle-axe symbolizes the offensive mission of a tank battalion.

The volcano is an allusion to Mt. Etna the most distinctive feature of Sicily where the unit first saw action. The eruption of flames refers to subsequent participation in thirteen campaigns in Italy, France, Germany, and Korea. Two awards of the French Croix de Guerre with Palm are identified by the surrounding branches of laurel, while a third award with Silver-Gilt Star is marked by the star on the fleur-de-lis which refers to the assault landing in Southern France. Crossed lances denote the courage and aggressive spirit displayed throughout many campaigns. The red and blue hourglass shape is an adaptation of the shoulder sleeve insignia of the 7th Division with which the unit served in Korea through six campaigns, twice receiving the Korean Presidential Unit Citation.

Distinctive Insignia

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

77th Armor

Insiste Firmiter

Lineage and Honors

Constituted 13 January 1941 in the Regular Army as 73d Tank Battalion (Medium). Redesignated 8 May 1941 as 753d Tank Battalion (Medium). Activated 1 June 1941 at Fort Benning, Georgia. Reorganized and redesignated 29 March 1944 as 753d Tank Battalion. Inactivated 9-15 January 1946 at Camp Patrick Henry, Virginia.

Activated 1 August 1946 at Fort Knox, Kentucky. Inactivated 15 October 1946 at Fort Knox, Kentucky.

Redesignated 20 March 1949 as 77th Heavy Tank Battalion, assigned to 7th Infantry Division and activated in Japan. Reorganized and redesignated 5 August 1950 as 77th Tank Battalion. Inactivated 10 November 1951 in Korea and relieved from assignment to 7th Infantry Division.

Redesignated 24 January 1962 as 77th Armor, a parent regiment under the Combat Arms Regimental System.

Campaign Participation Credit

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

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

Vietnam
- counteroffensive Phase 5
- counteroffensive Phase 6
- Tet 69 — flash counteroffensive
- summer-fall 1969
- winter-spring 1970
- Sanctuary counteroffensive
- counteroffensive Phase 7
- consolidation I

Decorations

French Croix de Guerre with Palm, World War II, Streamer embroidered CENTRAL ITALY (753d Tank Battalion cited; DA GO 43, 1950)

French Croix de Guerre with Palm, World War II, Streamer embroidered VOSGES (753d Tank Battalion cited; DA GO 43, 1950)

French Croix de Guerre with Silver-Gilt Star, World War II, Streamer embroidered MOUNT MAJO (753d Tank Battalion cited; DA GO 43, 1950)

French Croix de Guerre, World War II, Fourragere (753d Tank Battalion cited; DA GO 43, 1950)

Republic of Korea Presidential Unit Citation, Streamer embroidered SEOUL (77th Tank Battalion cited; DA GO 35, 1951)

Republic of Korea Presidential Unit Citation, Streamer embroidered KOREA (77th Tank Battalion cited; DA GO 22, 1956)