ARMOR

Camouflaging Tanks: A Lost Art?

see Page 10

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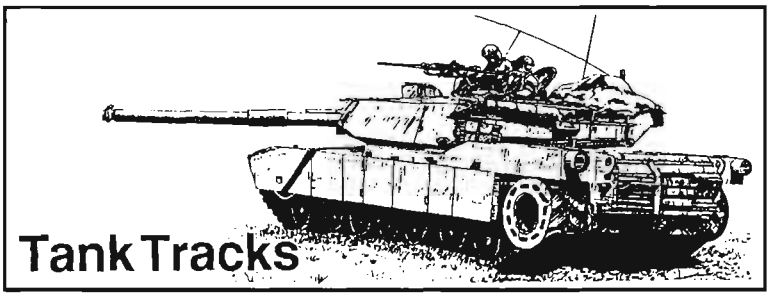

Tank Tracks

We think of survivability most often in terms of armor protection and the ability to shoot and scoot. But there are other ways and means that we can employ to avoid enemy detection in the first place. Camouflage is an art at which we probably have not been very good. Yet, can anyone design a cheaper, more cost-effective means of avoiding detection? Our cover story by Captain Mark J. Reardon, **Camouflaging Tanks: A Lost Art?**, provides simple tips and techniques that crews and their leaders can apply in camouflage. They are based on the principles of METT-T and vary with the situation and environment. With a little training and a practiced eye, a commander could have a complete unit of artists.

You might have noticed that our TOEs provide no padding – extra bodies to replace killed or wounded crewmen in battle. Where are replacement drivers, TCs, gunners, and loaders to come from? Captain Russell Shumway provides an analysis and suggestions on how to replace Abrams and Bradley crewmen with soldiers of other MOSs. His evaluation of necessary skills and the time needed to train those skills by position is illuminating. It should come as no surprise that commanders will find it hardest to replace gunners. In **Combat Crew Reconstitution**, you'll see why cross-training is an absolute must.

General William A. Knowlton retired from active duty in 1980. But 35 years before that he was a young lieutenant with the mission to take his reconnaissance troop almost 100 miles through the German 12th Army to link up with the Russians north of Berlin. In **Your Mission Is to Contact the Russians**, we reprint then Captain Knowlton's account of this mission, for which he won the Silver Star, from the August 1945 issue of *Reader's Digest*. This is a wonderful story full of drama and humor, and draws a bead on what it means to possess courage and confidence in yourself and your soldiers. His troop bluffed its way through to the Russians, while disarming an estimated quarter-million German soldiers.

Tanks are wonderful things, there is no doubt. But many writers in various media are now predicting that they are the modern dinosaurs, that they will disappear from the battlefield within the next two decades. This is a threatening attitude to us, one that we will, under no circumstances, believe. We must be careful to not sound like the old horse soldiers when we argue this premise? Tanks are nearing prohibitive costliness. It seems that, like other technology, we cannot keep ahead. We build an expensive fighting machine, though it may be the world's best at the time, and the other fellow comes up with a cheap method to make it less effective within a couple years. Is it a fair exchange to trade a $3-million tank for a round that costs tens of thousands? The answer is probably more obvious that we care to admit. In three related stories, we have pictures of alternatives. 1LT Steven Witkowski explores in **Return of the Gunned Tank Destroyer** how the United States needs more (and therefore less-expensive) antitank cannons. He compares cannon vs. AT missiles, and the arguments for tracked vs. wheeled, armor vs. weight, and turret vs. hull-mounted.

In **A Missing Link in Support of Light and Heavy Forces**, former *ARMOR* editor LTC Burt Boudinot advocates an exotically-named, but practical LA^{3}IDF, which weighs about 20 tons and mounts a 120-mm mortar.

And John Larry Baer explains how we can look to the Navy, of all places, for a fast-shooting, high-velocity, system that can ruin a tank's day. In **The Navy's Antitank System**, he shows how the 76-mm OTOmatic gun system, which can fire 120 rounds per minute and has a range of 16 kms, can be adapted to a combat vehicle chassis.

See you at the Armor Conference, 9-11 May.

PJC

By Order of the Secretary of the Army:
CARL E. VUONO
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The Adjutant General

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Features

10 **Camouflaging Tanks: A Lost Art?**
by Captain Mark J. Reardon

16 **Combat Vehicle Crew Reconstitution**
by Captain Russell M. Shumway

21 **The Return of the Gunned Tank Destroyer**
by First Lieutenant Steven R. Witkowski

26 **"Your Mission Is to Contact the Russians..."**
by Captain William A. Knowlton

37 **Mission Accomplished; All Crews Safe**
by Lieutenant Colonel Paul D. Terry

40 **A Missing Link in Support of Light and Heavy Forces**
by Lieutenant Colonel Burton S. Boudinot (USA, Ret.)

42 **The Navy's Antitank System**
by John Larry Baer

Departments

2 Letters
5 Commander's Hatch
7 Driver's Seat
8 Armor Conference Schedule
9 Recognition Quiz
47 Recognition Quiz Answers
48 Bustle Rack
42 Books

LETTERS

UCOFT Limitations

Dear Sir:

This letter is to address some of Mr. L.E. Wright's comments concerning the UCOFT (Letters, Sep-Oct 88).

First, let's talk about the UCOFT and its programming. When the first prototype was completed, master gunners and subject matter experts from the Armor community spent months going through each exercise and evaluating it according to the gunnery doctrine of that time, 1984. They approved the software, and away we went. Now, the fact that gunnery doctrine is a dynamic and evolving subject is well known. And of course, there have been changes, but the only "doctrinal" change to the software that is needed is to correct the use of HEAT in chopper engagements and multiple engagements.

There are many other "glitches" that have been identified and are being corrected. These corrections, like most everything, are driven by the budget. Need I say more? The new disk pac for the M1 and M1A1 is being fielded now, and a third update is being developed that will include more target modes and possibly winter terrain.

Gamesmanship is an inherent part of all competition, whether it is against people, machines or systems. Only when you let it circumvent the learning of skills does it become a negative learning experience.

Which "certified" is Mr. Wright speaking of? Well, let's briefly discuss both. Concerning the crew, it is simply a word to indicate they have completed the matrix, nothing else. As far as the instructor/operator, it means he has attended an intense and challenging two-week course in the operation and use of the UCOFT in gunnery training and successfully passed 14 individual hands-on performance tasks.

Since the COFT has been in use, there have been various comments regarding its effectiveness, its capabilities, and also

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its place in the simulator world. Some have called it a million-dollar video game, a tank gunnery simulator, a training device, and a conduct-of-fire trainer, but COFT is much more. COFT is also a tool that identifies the phases in the man/machine interface relationship when the individual's stress overcomes his ability to achieve, when the machine becomes a true and viable enemy, when one's ego becomes blotted, and self-confidence wanes, when reality confronts self-evaluation, when reserve ability is called upon to master the machine, and when true performers can stand up and be counted.

How does this relate to the actual fighting machine, and what is the relationship of COFT training to battle condition? There is not, and never will be, a substitute for a true battle condition. During that situation, one has fright that cannot be simulated. But let's look at the condition and stress of battle versus the condition and stress encountered during crew training. In COFT, crew training creates peer pressure, high stress when failure occurs, command pressure to achieve, frustration when exercises cannot be mastered, disgust when beaten by the machine, and deflation of the ego as progression through the matrix at times is negative. What does this accomplish? It creates, after numerous tries to overcome, a high degree of self-confidence, a renewed ability to cope with pressure, a knowledge of actual stress points in one's abilities, and a realistic evaluation of true ability. With these factors known and under control, in real battle, fear is much easier to handle, and the functional aspects of tasks become almost second nature. The COFT, therefore, is also a psychological conditioning trainer, restructuring the man/machine attitude, destroying assumed capabilities, and creating knowledge of true ability.

The UCOFT simulator, and for that matter any simulator or weapon system, cannot be fully evaluated or criticized by one who has not mastered the system. Anyone who wishes to devaluate the system prior to mastering it, is like the rifleman who suggests increasing the size of the target bullseye because he cannot hit the center. Criticism is healthy only if it increases the standard. However, if the standard cannot be achieved, then shouldn't we search for ways to increase our abilities, not bring the standard to our abilities?

Finally, the fact that some deficiencies exist with the UCOFT doesn't reduce the fact that it is the "second best" training aid we've ever had for gunnery training! When we devote more time to it's positive use and less time to finding faults, the UCOFT allows crews to significantly improve their gunnery skills proficiency and maintain these skills. We are sure Mr. Wright will agree that today's armor crewmember is technically competent and extemely proficient. He has proven his ability to bring "Steel on Target" with deadly accuracy. Give credit where credit is due; the UCOFT has been an enormous factor in producing the desired results.

MICHAEL A. JENNINGS, BILLY E. LEVINE, DENNIS CHAMBERS, ROBERT L. HARRISON
Senior Instructor/Operators
Operations and Program Management
Armor Simulator Division
Weapons Department, USAARMS
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Embedded Training Devices Add Weight, Take Up Space

Dear Sir:

I enjoyed Major H. Critz Hardy's article, "Armor Training 1997: An Application of Embedded Training," (November-December 1988). He has obviously done his homework and understands well the benefits of embedded training.

He did not mention, however, what I consider to be the principal obstacle to employing fully embedded devices in weapon systems. The hardware and software necessary to provide meaningful training simply competes with combat essential equipment for weight and space. The Tank Appended Guardfist Program is a good example of the problem. Imagine trying to design that weight completely inside a turret.

It is certainly true that as technology progresses, the required volume and weight to achieve a given level of fidelity will shrink. On the other hand, our expectation of fidelity and demands on training systems will grow proportionately. This again places the training system back in competition with combat essential hardware.

A good compromise is what the Army is doing on the ADATS System. The ADATS System will have a simple port on the exterior of the vehicles to allow a simulator to be plugged in. The weapon system recognizes the simulator, if plugged in, and goes into a training mode on start-up.

By having the bulk of the training system external to the weapon system there is no need to compromise the quality of the training because of weight or space considerations. Using this "simulation port" approach minimizes the impact on the weapon system that embedded training will impose. Additionally, plug-in simulators would not have to be on a one-to-one ratio, therefore, reducing the overall cost.

DAVID TEICHMAN
Director, Gunnery Training
ECC International Corp.
Wayne, Pa.

Updating Bridging Weight Limit

Dear Sir:

The United States Army Engineer School, Fort Leonard Wood, Missouri, was especially pleased with your recent article in the November-December 1988 issue of ARMOR, titled "Assault and Tactical Bridging for Armor Units," by BG (Ret.) Philip L. Bolté.

This article succinctly points out the present and future assault bridging available to the force. Your concern for the subject is noteworthy.

Please note, however, that the portion of the article dealing with the Heavy Assault Bridge (HAB) is somewhat inaccurate. The HAB will be capable of crossing MLC 70 vehicles over a wet or dry gap, not to exceed 26 meters.

Thanks again for your concerned and informative article on assault bridging.

COL HAROLD M. BEARDSLEE
Director of Combat Developments
U.S. Army Engineer School
Ft. Leonard Wood, Mo.

Air, Ground Cavalry Need to Agree on Missions

Dear Sir:

I was very happy to see LTC Gordy Sayre's article titled "Aviation Doctrine - Where Are You?" in the November-December 1988 issue of ARMOR. I totally agree with LTC Sayre's comments regarding doctrine as written at Fort Rucker and Fort Knox. LTC Sayre has clearly pointed out the fact to us that "the choir is not singing from the same sheet of music!"

Cavalry, by its very nature, has a difficult mission to perform, with complex training requirements. Air cavalry and attack helicopter organizations in the divisional cavalry squadrons, and armored cavalry

regiments, clearly have a cavalry maneuver mission. The air cavalry's mission is the same as ground cavalry, the only difference being cavalrymen in helicopter units move around the battlefield in a different vehicle with greater mobility. Because of its mobility, air cavalry is most suited to the role of zone, area, and route reconnaissance. No other unit can screen forward, or the flanks of a fast moving armor force, as well as air cavalry. Nor can any unit move as quickly to a trouble spot on the battlefield as an attack helicopter.

The problem, simply stated, is that cavalry squadrons are composed of ground cavalry units (Armor Branch), and aviation units (Aviation Branch). Both Aviation and Armor Branches write doctrine for their half of the cavalry squadron or regiment and leave it to the field commanders to make it work in the field. Commanders and S3s generally have little or no background in aviation, while aviators don't know, or care to know, about "Grunt Stuff!" That may be an oversimplification of the problem, but that's it in a "nutshell."

How do we fix the problem? We all agree we need to focus the training of air/ground cavalrymen toward the combat employment of cavalry as a combined arms team, task organized to accomplish the commander's intent. We must plan combat operations with air cavalry and attack helicopter units considered as maneuver units, fully integrated into the commander's plan of maneuver from the very beginning. To do this, one branch needs to be the proponent for all cavalry, including air cavalry and attack helicopter units. This is necessary to control the doctrine and training of both air and ground cavalry units. Secondly, we need to return to the 15/12 OPMS identifier for aviator officers assigned to cavalry, thus ensuring cavalry related ground assignments for qualified aviation officers and retention of cavalry skills once learned.

The solutions I have proposed may not be achievable in the near future for one reason or another. As a short-term fix, I would recommend the establishment of a "Cavalry Officer Course" at Fort Knox, required for all commissioned and warrant officers going to cavalry assignments. The course should be for squadron commanders, primary and special staff officers, troop commanders, platoon leaders, and warrant officers, and focus on air/ground cavalry specific doctrine. This course should equally address ground cavalry doctrine for aviators, and air cavalry doctrine for ground cavalry officers. The course should also address logistics and maintenance and give both ground and air officers plenty of hands-on experience. Once an officer/warrant officer finishes this course, a skill identifier, much like prefix 5, needs to be added to the officer's records so that the skill learned in this course can be retained for future cavalry-related assignments.

How much longer are we going to keep shooting ourselves in the foot before we figure out it hurts? Let's resolve this dilemma and get on with our business of making cavalry the true combined arms team capable of doing its combat mission.

MATT D. McKNIGHT
LTC, TN ARNG
Smyrna, Tenn.

European Terrain Challenges Existing Bridging Capacity

Dear Sir:

I read Brigadier General Philip L. Bolté's article on assault and tactical bridging for armor units in the November/December ARMOR with great interest. Having commanded a British engineer squadron (company) in Europe, I readily identified with the problems of getting the 30th Infantry Division's tanks through the quagmire and into the bridgehead in 1944.

In the British sector of Europe, to which U.S. forces could well provide reinforcements, it is quite common for assault or tactical bridging operations to take less time than the provision of access and egress. Neither is the problem confined to the immediate area of the banks, for the approach to bridging sites is often across water meadows with very low bearing capacity.

Engineer commanders quickly learn to have their reconnaissance parties assess the complete approaches to and exits from bridging sites. Supplies to overcome the problem, be they rip-rap or matting, are ordered to arrive with or before the bridging.

It is unfortunate that the terrain at the National Training Center does not present this problem, with the result that generations of task force and engineer commanders remain blissfully unaware of its seriousness. Neither will the tactical situation always conform to use of existing bridge sites with concrete ramps. It was in anticipation of such problems in REFORGER 87 that the U.S. Army prepositioned stocks of German and British trackway expedients at field crossing sites. One further expedient, that was not mentioned in BG Bolté's article and which is cheaper than using the limited assets of assault bridging, is the fascine. The modern fascine, which consists of a bundle of strong plastic pipes, is an ideal means for quickly crossing drainage and antitank ditches. It is very much an assault expedient, which can be improved for sustained use by dozing some soil over the pipes and then superimposing an expedient mat. Indeed, apart from being far cheaper than assault bridging, a fascine is often more practical; in certain bank configurations, a bridge can be too long, and either the ends of the bridge are in mid-air or the bridge is bearing on the ground at a point for which it was not designed.

In summary, the frequent occurrence of unfordable waterways in Europe will present problems beyond just that of providing assault and tactical bridging, which task force, engineer, and logistic commanders need address before the outbreak of war.

R.K. FAWCUS
Colonel, Engineers
British Liaison Officer,
Fort Belvoir, Va.

Remembering "Patton's NTC"

Dear Sir:

I enjoyed the article by Francis G. Blake on the Desert Training Center (November-December 1988 ARMOR). It brought back memories of the time I spent there at Camp Iron Mountain and Camp Ibis with the 4th Armored Division in 1942 and 1943. I thought you might be interested in the enclosed news item from the Desert Sun of 11 November...

HAROLD W. WEISS
COL (U.S.A., Ret.)
Palm Desert, Calif.

(COL Weiss enclosed a feature, datelined Chiriaco Summit, Calif., describing the dedication ceremony at the General Patton Memorial Museum. A crowd of more than 4,000 people, many of them veterans of the DTC, turned out for the ceremony, a tour of the museum, a USO show, and speeches. -Ed.)

Correction

Due to a proofreading error in an article about Soviet General Andrei Kravchenko, in the November-December ARMOR, his unit was misidentified as the IV Guards Tank Corps, rather than the V Guards Tank Corps.

Remembering Some Hard-Fought Lessons of World War II

Part 2

In a guest column Commander's Hatch in the last issue of ARMOR, LTG James Hollingsworth, USA, Ret., began a discussion of combat lessons learned in WWII. This column concludes the discussion with one of the war's great battalion commanders. The comments in italics are mine.

-MG Thomas H. Tait

Combat Operations

How did units breach obstacles? What were the most effective obstacles, and how were they breached?

Major obstacles we faced included hedgerows, the Siegfried Line, rivers, canals, and minefields.

- British "Flails" - These were rotating chains on a barrel-like structure, mounted on the front of the British Churchill tank. This was the best method for mechanized forces.

- Soldiers with bayonets worked well for antitank mines.

- Antipersonnel mines were exploded with artillery and by driving tanks over them. However, the mix of antitank and antipersonnel mines required a combination of effort.

- Hedgerows - *(In Normandy, farm fields were often bordered by hedgerows, very dense strips of heavy brush that prevented tanks from moving from field to field. -Ed.)* This required the modification of tanks, one or two per platoon, with four-foot sections of sharpened railroad track welded on the front of the tank in a shape like a a fork, with four prongs that cut holes through the hedgerows. We assigned a squad (8-10 men) of infantry to lead each tank through the opening. Infantry is vital to get tanks through close terrain, including urban terrain, in battle.

- The Siegfried Line - We used massive artillery in support of tank-infantry teams on very narrow frontages (a tank company had 17 tanks; the infantry company, 225 men). Attacking on a 150-yard front, the team might face two to four fortified, heavily-armed, concrete pillboxes. During WWII, no weapon in the hands of U.S. or British troops could penetrate the concrete bunker.

My battalion, 2-67 Armor, made a successful penetration of the Siegfried Line on 8 October 1944, using tank dozers to cover the entrances of the concrete bunkers, after we made a hole in the line. We left the German soldiers in the bunkers. There was not enough infantry to go in the bunkers and capture them.

- River Crossings - These were division engineer battalion responsibilities.

Canals - Division engineer responsibility - brigade platoon attached to battalion task force. During the closing of Ruhr Pocket, Task Force Hollingsworth 2/67 AR; 1/92 Armored FA; A&B Co, 1/41 Inf, crossed *under* a canal, during hours of darkness.

We have not modernized our obstacle clearing/crossing forces. Our bayonets are shorter. The new dozer blades and rollers are so heavy they increase the weight of the M1A1 to over 70 tons. We need two things - the Engineer E-Force organization, which gives each maneuver brigade an engineer battalion, and a combat maneuver vehicle (CMV) that can clear and cover obstacles. These are absolutely essential for the conduct of the AirLand Battle.

Were counter-reconnaissance operations conducted? If so, at what level were they planned and how were they controlled?

Little or no counter-reconnaissance, as such, was conducted at battalion and regimental level. counter-reconnaissance during the preparation phase of a major battle, if at all.

How did you employ tank destroyer units? Do they have a place on the AirLand Battlefield?

Tank destroyers were split and attached, by companies and platoons, to a battalion task force. Today, they would not be necessary if tanks have the capability to knock out future Soviet tanks.

A well-known general once said that, in WWII, the maneuver forces

were essentially a way to get the artillery to the next phase of the battle. Once there, he brought the artillery, the decisive combat power, to bear on the enemy. Was this valid from your perspective? In Korea? In Vietnam?

Artillery represents massive, indirect firepower for support of tank and infantry task forces. But artillery cannot hold ground, cannot dig enemy infantry out of the Siegfried Line, enter built-up areas, etc.

During the 16-19 November 1944 battles (involving the 66th Armored Regiment, 67th Armored Regiment, 41st Armored Infantry Regiment) from the Worm River to the Rhor River, the 2/67 AR (my battalion task force) faced 22 Royal Tigers (a panzer regiment). A sergeant tank commander adjusted three rounds of 105-mm on the 22 tanks, followed by a 32-battalion TOT - of 105-mm, 155-mm, 8-in. howitzers, and 155-mm, 8-in., and 240-mm guns. The 22 Royal Tigers vanished, leaving three tanks on the battlefield. Our 75-mm and 76-mm tank guns would not penetrate the Tigers. The 90-mm TD guns of the 201st TD Bn. also failed to penetrate. Thank God for artillery.

In Vietnam and Korea, the only firepower we had, other than the rifle, was artillery.

In combat, how much did you rely on written orders, in comparison to face-to-face or radio-transmitted operations orders?

In WWII, we used no written orders, other than for historical purposes. In Vietnam, we used written orders for the record.

Face-to-face, or secure voice, is the only practical way to run a battle. Changes occur too fast for even the historical order to be put on paper - written orders are after-the-fact.

For a set-piece battle (breakthrough), it's okay to write orders, but things change every day....The sand table is important, if time and means permit. Be sure you, as commanders, personally explain to the soldier and junior leader. Don't leave anything for chance. *Great advice.*

In combat at the battalion or brigade level, what role does the XO play? The S3? What special skills should these officers have?

The battalion XO is a *GOFER* - he checks the rear. The S3 runs the scenario with the battalion commander. He carries the backpack radio, and accompanies the battalion commander every minute of the day. Battalion and brigade commanders, and their S3s, should possess the skills to command a division on short notice.

Officers skills start development at birth - the personality to lead, the physical structure to lead, mental attitude, controlled habits, discipline, ingenuity, aggressiveness, adventurousness, a challenger, respect for elders, harmonious accommodation of others, self-respect, desire to compete and be the best. These inherited characteristics, coupled with 10 years of military life and school with the soldier, (are needed) to lead a regiment or division in battle. After all, some of us were 26-year-old battalion and regimental task force commanders of combined arms teams.

We must understand people and communicate with them *in their language.*

This is the essence of leadership. We have a tendency to reduce our presence with the troops, and tend to rely on high tech to get the job done. In my opinion, this is the wrong approach to combat leadership.

How much task force organizing was really done at battalion level? Did the benefits/advantages outweigh the problems?

There is nothing to task with at the tank battalion/armored infantry battalion level. Tank battalions receive infantry COs from the brigade or division commander. Infantry battalions receive tanks from the brigade and division commanders.

Task forces are essential for success in battle. It is difficult to think of a situation where tanks alone, or infantry alone, or artillery alone, or armored cavalry alone, could fight in Europe, Korea, the Mideast, Latin-America, East Africa, Texas, or Mexico successfully.

The division commander directs his self-sustaining battalions to do certain jobs. The tactical headquarters (brigades) take the battalions and task-organize to do the job, with the approval and supervision of the division commander. The organization of brigade can change often.

How were replacements handled? Individual? Crew? Unit? Which way is best?

• Since every man in a four-man tank crew may not become a casualty at the same time, and tanks often lose one or more crew members at a given time, individuals must be available to replace partial crews. It makes no sense to discard the individual replacement system. The

Continued on Page 45

When Is a Tank Not a Tank?

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

When would you not call an M1 or M1A1 a TANK?

The 20th century has seen many rapid changes in our Army. Each decade, new equipment or modernized equipment has brought changes in operations and training. Hopefully?

A couple weeks ago, I was standing with a group of civilians when one questioned the reduced size of the gun on the new tank. I commented it was not a tank but the Bradley Fighting Vehicle. Comments like that are expected from people who do not know the different equipment in our Army. Why, I would bet you that some civilians think that the parachute the soldiers use at Jump School is the same one the Golden Knights use during their demonstrations. Could we go one step further and say that some of our soldiers believe that? Possibly. Not every soldier has seen either the Golden Knights or a soldier jump out of a plane.

Odds are there are a lot of soldiers who believe that all tanks are the same - just look at them! They all have tracks, thick armored sides, a long gun and a traversing turret: Not all those soldiers are privates. The problem gets larger when you add training and maintenance.

Could you imagine training a Blackhawk pilot with an OH58? We would never do that. We have good training programs in our aviation system. They need to be there to support the crew and those that are required to ride and fight the system!

The M1 series tank is a sophisticated piece of equipment. It is designed and is capable of fighting at a high rate of speed (not so with other tanks). We had to change tactical doctrine, support doctrine, and training support. Tactical and supporting vehicles and equipment followed suit, but there is one area that has not seen change.

There are those in our Army who do not understand what it takes to effectively command a TANK.

As an example, 75 percent of all tank commanders must attend BNCOC. You would expect BNCOC to teach and graduate a tank commander who is fully capable of applying the tactical doctrine required to fight the system as an integral part of the platoon.

Years ago, when ANCOC was first introduced as an exportable program of instruction, we came up with a magical time (4 weeks) that it took all combat arms NCOs to go to their basic course to become proficient in the CMF Skill Level 3. As you recall, the 11C mortar section chief took hits from everyone because he was unable to consume all the material, and consequently failed the course. It was so bad that another course for platoon leaders and platoon sergeants was initiated.

When the M1 became part of the Army's inventory, without realizing the tactical doctrine changes, we tried to teach it in four weeks. It was a good course, but it contained nothing on tanks, even after it was extended to six weeks. Nobody wanted to fire the vehicle. As a matter of fact, most commands fought the tactical portion. Even today, some commands fight the expansion of the school and the best training for their NCOs.

You cannot really point your finger at any one area. I believe it's the way we have always done business. What was good for the M48 or the M60 is good for the M1-series vehicle. Because they are all tanks, the training philosophy should be the same.

Now that we use the NTC, we have become concerned about the inability of M1s to apply fire and maneuver at a high rate of speed, and to acquire and hit targets.

It's a challenge to the commanders of armor organizations to stand up and demand the competence level that gives the capability to command an organization in both peace and war that can effectively obtain mission goals without some untimely training requirement.

When is a tank, not a tank? When everyone else thinks it's an M48 or M60 and requires you to train the same old way and to maneuver through table VIII at 5-10 mph.

Maybe, we ought to name the M1 series the Abrams Fighting Vehicle, and then everyone would realize it is not the same old tank, and recognize the resources required to effectively man and fight the vehicle.

1989 Armor Conference Agenda

9-11 May 1989

Theme: Combined Arms - The Brigade Fight

Tuesday, 9 May 1989

0900-2200	Registration (Officers' Club)	Regimental Room
1300-1645	Displays	Skidgel, Hill Halls, SIMNET
1700-1730	Retreat Ceremony IHO the Regiments	Brooks Field
1800-2000	Commanding General's Garden Party	Quarters #1
2030-2200	Buffet and Regimental Assemblies	Officers' Club

Wednesday, 10 May 1989

0700-1100	Late Registration	Gaffey #2
0800-0805	Welcome/Admin	Gaffey Aud.
0805-0845	Keynote Address – GEN Thurman (or LTG Wishart)	Gaffey Aud.
0845-0930	Report to the Force – MG Tait	Gaffey Aud.
0930-1000	Break	
1000-1035	Threat – DCD	Gaffey Aud.
1035-1115	Soviet Exercises – MG P. Taylor	Gaffey Aud.
1115-1145	Armor Association General Membership Meeting	Gaffey Aud.
	Executive Council, Armor Association Luncheon	Officers' Club
1145-1300	Lunch	
1300-1345	Training in USAREUR – BG Tilelli	Gaffey Aud.
1345-1430	NTC Trends – BG Funk	Gaffey Audi
0800-1800	Displays (all day)	Skidgel, Hill Halls, SIMNET
1800-2200	Armor Association Banquet - GEN Saint	Main NCO Club
	1800 – Cocktails	Patton Museum
	1900 – Banquet	NCO Club

Thursday, 11 May 1989

0800-0930	Bde/TF Synchronization – Panel	Gaffey Aud.
0930-1000	Break	
1000-1030	Artillery in the Brigade Fight – MG Hallada	Gaffey Aud.
1030-1100	Engineer E-Force – MG Schroeder	Gaffey Aud.
1100-1130	Armor/Anti-Armor – COL(P) White	Gaffey Aud.
1130-1300	Chief of Armor Luncheon – LTG Graves	Officers' Club
1300-1430	Combat Developments – DCD	Gaffey Aud.
1430-1500	Farewell Remarks – MG Tait	Gaffey Aud.
0800-1600	Displays (all day)	Skidgel, Hill Halls, SIMNET

Conference Information

POC for general officers' and presenters' billeting:
USAARMC Protocol Office: AV 464-6951/2744

Billeting for other personnel:
Housing at AV 464-3138
Transportation from Standiford Field to Ft. Knox provided.

POC for equipment displays:
DCD, CPT Doug Busch, AV 464-1250/1750/6347/26580

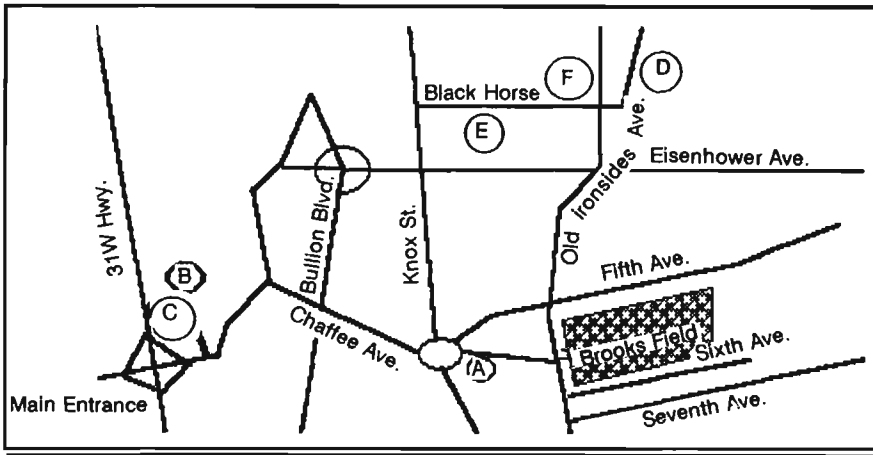
Overall POC for Armor Conference:
CPT Greg Gebo, AV 464-1050/1441

Registration fee: $5.00 (Refreshments)

Estimated Cost of Social Events: $30.00

Uniform: Class B

Commerical Prefix for Ft. Knox: (502) 624-XXXX



A - Officers' Club
B - NCO Club
C - Patton Museum
D - Skidgel Hall
E - SIMNET Building
F - Gaffey Hall

Key Conference Sites

Note: Hill Hall is not within the map area. It is at the interesection of Wilson and Frazier Roads

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 47

Camouflaging Tanks: A Lost Art?

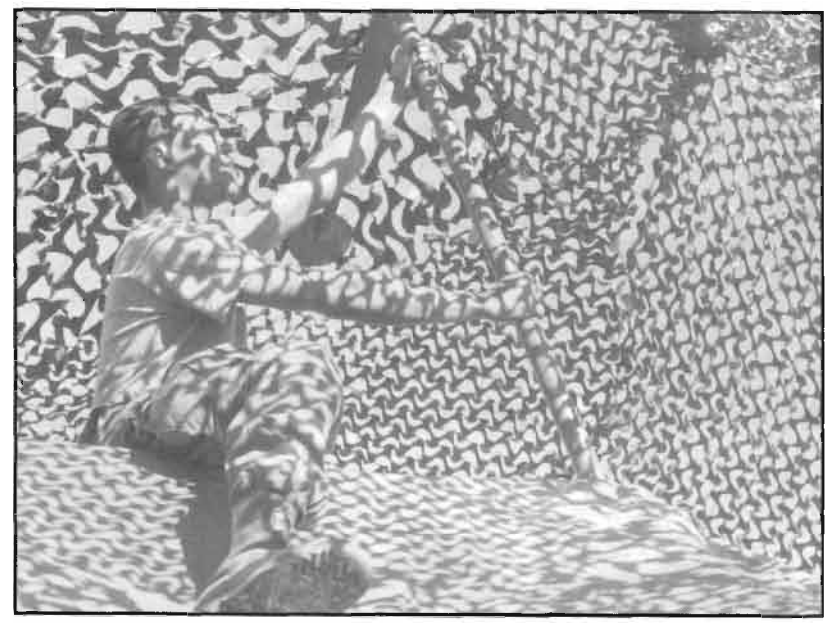
by Captain Mark J. Reardon

With so much justifiable emphasis on Common Task Testing (CTT), Soldier's Manual tasks, Tank Crew Gunnery skills, and other training, it is no surprise that we tend to lose sight of some of the more fundamental soldier tasks, namely that of fieldcraft.

Fieldcraft, loosely defined, is the information needed to live outdoors and survive on the battlefield. It is the foundation of warrior knowledge handed down from generation to generation, a living history of sorely-won experience.

This historical record of common sense also reflects how we have fought our past wars. The U.S. Army has generally enjoyed a materiel superiority and command of the air. Few of our enemies have commented favorably on the American Army's ability to camouflage vehicles and positions. In the next war we are expected to fight outnumbered and win. Thus we find ourselves relying on combat multipliers to magnify the effectiveness of our forces. What combat multiplier can we apply through fieldcraft skills that will assist us in getting off the first shots, thus statistically increasing fivefold our chances of winning an engagement? The answer may be partially in mastering an art for which the U.S. Army has never really been noted: camouflage!

FM 101-5-1 defines camouflage as "concealment and disguise to minimize enemy detection or identification of troops, weapons, equipment, and installations. It includes taking advantage of the immediate environment as well as using natural and artificial materials."



Nobody enjoys the labor of erecting camouflage nets, but concealment is essential if an army is fighting outnumbered and hopes to win.

To troops, that means cutting branches to shove in the infantry rails, struggling with camouflage screens that tend to stick to every protrusion on the turret, and covering up tank tracks. Simply speaking, tankers have to conceal a 10-foot-high tracked monster by blending it in with its natural surroundings: not an easy task considering the size and mobility of the object to be concealed and nature's unnerving habit of constantly varying your surroundings. The problem is further compounded because it requires a lot of hard physical labor, and, therefore, nobody really enjoys doing it. To relieve themselves of this labor-intensive task, armor soldiers have argued that in the quick-moving and fluid situations that often characterize armored operations, combat elements do not have the necessary time to camouflage with nets and foliage. Not so! The answer is to train to proper standards.

We have attempted to solve the problem of concealment by devising new paint schemes. In the mid-1970s, the U.S. Army adopted the four-color paint scheme to replace the previous olive drab and white star livery. Within a few years, flaws

became evident in this new scheme, including the fact that the gull-shaped black patterns were distinctly visible through passive night vision devices. This led to a 1978 test by the Combat Developments Experimentation Center, which evaluated the DUAL TEX camouflage pattern developed by the U.S. Military Academy's Behavioral Science and Leadership Department. This appeared to offer a distinct improvement over both the solid green and four-color camouflage paint schemes. What transpired was that the DUAL TEX pattern apparently escaped detection by observers using the naked eye, but was more susceptible to detection with binoculars. These results varied even between vehicle types. DUAL TEX pattern painting also was more effective at night and against aerial observers. However, it has not been adopted Army-wide. Factors that affected this decision included that it took up to 22.1 hours to convert an M60-series vehicle to DUAL TEX, and 11.8 hours for the relatively simple M113. Rollers and brushes were required to paint DUAL TEX, though we thought that spray paint equipment could be converted to apply the new camouflage scheme. Based on the difficulty, number of vehicles to be painted, and yearly repainting requirements, the DUAL TEX system did not offer a significant advantage to justify its adoption.

What was apparent during the DUAL TEX testing was that paint alone is not the answer to the armor community's concealment needs. In a field environment, dust and mud accumulated fairly quickly and nullified the efforts of camouflage paint patterns. Dust especially had a detrimental effect because of its sunlight-reflective properties, thus causing a sharp contrast between the vehicle and any dark background, such as a treeline. Vehicles were detected with less frequency when the crew periodically brushed off the accumulated dust with a broom. Other important factors that surfaced included proximity of the vehicle to vegetation, angle of the sun and changing shadows, vehicle silhouette and defilade, and position relative to the observer. Armor leaders must know correct camouflage procedures and doctrine so that they can impart this knowledge to their subordinates. The trouble is that nobody has put together a "How to camouflage" manual. This is no simple task.

To train the trainer in camouflage tactics requires a thorough knowledge of effective camouflage techniques peculiar to armored operations. Measures that are inappropriate and time-wasting are identified and discarded from training programs. The camouflage process is aimed at concealing tanks and support vehicles from both aerial and ground observers. Additionally, armor, by design, is a mobile force, and any camouflage measures must

The Dual Tex Experiment...

The Dual Tex camouflage scheme, seen here on an M60-series tank and an M113, was subjected to extensive testing in past years.

A German Leopard in snow camouflage prepares to move out of a hull-down position during Reforger '85.

take into account the need to move repeatedly and quickly. Concealment techniques should not interfere with the armament systems. The lack of subject matter experts complicates the education process.

The silhouette of an armored vehicle provides the main cue to its detection. Enemy observers will use both aerial and ground platforms in their efforts to find friendly armored vehicles. Ground observers generally have more time in which to scan a selected area because aerial platforms tend to produce a distinctive signature, which draws undue attention and does not allow them to linger for extended periods. The main purpose of camouflage then would be to defeat the enemy observers by allowing friendly vehicles to blend in with their surroundings.

The materials available are both man-made, natural, and issue items. Man-made objects include houses, construction site items, etc., when an armored unit may find itself in an urban environment. Natural materials, such as evergreen foliage, straw, branches, grass, and other items allow a vehicle to blend in with the outdoor, woodland, or plains environment.

Army issue camouflage items, radar-scattering cammo nets for use in wooded areas, snow, and desert, are designed to be erected over a vehicle using support poles with "butterflies" and stakes. However, armored units often custom fit or simply wrap the nets around gun tubes and over the turrets. Only ingenuity should limit the possibilities of what materials can help conceal a vehicle or position.

Each type of vehicle in any armor battalion requires a careful examination in order to determine what is the most effective type of camouflage, based on design features, mobility requirements, and mission profile. The M60A3, with its infantry rail, bustle rack, and sponson boxes, has many accessible places where natural foliage can be easily affixed as camouflage. The M1, with its smooth turret sides, side skirts, and relatively clean lines presents a problem that attached foliage cannot fully solve, thus dictating custom-fitted camouflage nets as one solution for on-the-move camouflage measures.

Infantry units use WD-1 communications wire tied in criss-cross patterns along the flat sides of the M113 in order to hold natural camouflage. This has proved quite effective on numerous occasions and can be applied to the whole family of M113 variants. Similar measures can work with the other support vehicles found in frontline positions, the M88A1 in particular. Tree branches and netting can be hung along the sides and rear deck, with netting or branches affixed to the boom to obscure its distinctive shape in the raised position. A bit of experimentation will soon show the best camouflage configuration, which allows the mechanics unimpeded working room.

As combat support vehicles ply the road networks, they should be camouflaged with radar-scattering nets and tree branches, which allow them to quickly pull off the road and blend into the scenery when hostile aircraft pass overhead.

Some units may find it difficult to adhere to these measures due to their vehicle design or mission, however, difficulty should not be an excuse to ignore concealment measures. Anyone doubting the effectiveness of even relatively unsophisticated ground attack aircraft has but to read any account of the German Army in the Battle of Normandy.

Camouflage is even more important in the defense because the position is static and the enemy has plenty of time to look it over prior to the attack.

The requirement for tanks to remain mobile and able to react quickly dictates that some thought be given to affixing camouflage. It is a waste of time to repeatedly camouflage certain portions of the tank, only to have it fall or be knocked off every time the vehicle moves. Thus, most temporarily-affixed foliage or radar-scattering nets should be placed above sponson box level. The concealment of the hull is accomplished by frequently occupying hull-down positions. The tank crew has only to concentrate on blending the turret and back decks in with the scenery. The gun tube is concealed by wrapping WD-1 commo wire and tree branches around it. When the range card is finished, the 105-mm is depressed so it blends in with the ground, leaving observation to the tank commander's binoculars or to selected tanks' thermal sights. Main guns are a dead giveaway if they protrude horizontally over a ridgeline or out of a shadowed treeline. To use terrain effectively to conceal the hull climinates the need to spend time camouflaging the suspension, and contributes to the vehicle's survivability by providing cover from direct fire and lowering the tank's profile. This limitation to the placement of on-board camouflage also cuts down the amount of time needed to tactically conceal combat vehicles and to replace camouflage material when it is lost or damaged.

Armor soldiers should note that BELOW the sponson box is the cut-off point. The top of the hull should remain camouflaged to deceive aerial observers when it is not feasible to erect netting.

In an offensive situation, camouflage is generally limited to keeping the vehicle hull- or turret-down while moving, and camouflaging the turret, back deck, and gun tube in order to break up the silhouette. This provides a more difficult target for enemy gunners as they try to obtain the correct sight picture.

Camouflage requirements in a defensive situation are more exacting. This is because the defender is usually stationary, at least initially, in a generally known location that may be subjected to intense scrutinization prior to any attack. This calls for stringent camouflage discipline in order to defeat photo reconnaissance, patrols, etc. Because the defender is usually numerically inferior, it behooves him to remain undetected in order to preserve his combat power from preparatory fires and to achieve surprise.

Tanks can be concealed most effectively by driving into woods, buildings, or by using the camouflage screening systems. One drawback of these methods is that they limit fields of fire. The speeds at which modern armored vehicles can travel cross country demand quick reaction times and good fields of traverse for defending tankers. To position a tank on a hillside within a not-too-heavily vegetated area offers an ideal defensive position. A hidden tank on a ridgeline may or may not have a sky background. It must conceal its man-made angles with foliage or netting. Branches are inserted upright into the bustle rack area and around the infantry rails, taking care not to obscure the laser or sighting systems. Camouflage should be placed in front of the loader's hatch and the wind sensor. This conceals the sensor mast and decreases the movement signature of anyone entering/exiting through the loader's hatch. Natural camouflage, easily removed, should be placed on the forward part of the turret roof and cupola. Always walk out in front of your positions, if possible, to check out the effectiveness of your work.

A limited number of ideal positions may force some tankers to be

in areas where the chance of detection by aircraft is increased. In these circumstances, the use of a camouflage screening system is recommended. A camouflage system consists of nets (either diamond or hex), support poles, "butterflies," stakes, and rope. The more complete the set, the easier it is to correctly conceal a tank. The key is to camouflage the vehicle and allow it also to FIGHT that position. In this situation, the tank is oriented toward the most likely enemy avenue of approach. The netting should conceal the vehicle from the mantlet rearward. This allows observation, limited turret traverse, and firing of the main gun. The forward portion of the tank can be hidden with foliage or by draping a smaller diamond net over the front slope. Too many times I have seen tankers putting the nets over the sighting system and main gun while leaving the relatively broad and visible rear deck exposed. I can only assume this is to aid withdrawal upon enemy contact. WRONG!

Take the time to obliterate the tracks leading into any battle position. We have taught other armies that this contributes to survival. In the next conflict, we may not have air superiority or even parity. During peacetime, it is a great way to conceal yourself from the brigade commander's helicopter.

One important aspect in training like we are going to fight is to include camouflage procedures into tank prep-to-fire checklists. So why do we go down Table XII without TA-50 and uncamouflaged? This deprives our crews of learning where to put camouflage, and where not to put it. In this case, altered radar-scattering nets draped over the turret may prove to be more effective than natural camouflage for shooting on the move. Guidelines for combining camouflage and live firing should take into consideration muzzle blast, turret traverse, and fire control systems. The turret should be able to traverse freely, with branches and hanging nets providing no impediment to movement. The crew should be able to see, lase, and shoot while buttoned up. Do not allow branches, etc. to obscure the gunner's primary or secondary sights, the laser rangefinder, wind sensor, or commander's optical systems. The main gun blast may set fire to camouflage too near the muzzle itself or alter the position of poorly secured natural foliage and screening nets. Learn these lessons in a safe training environment rather than during the first battle of the next war.

Lastly, urbanization is thrusting city camouflage techniques to a position of greater priority. Most U.S. Army systems are designed for operating in the countryside and are sometimes incompatible with MOUT situations. Canvas tarpaulins can be stretched over alleyways where tanks are parked to conceal them from aerial observation. Materials such as plastic or canvas sheeting, aluminum siding, and corrugated tin are available at construction sites and lumber yards for camouflaging tanks in a built-up area. Houses and barns offer protection.

If you choose to drive a tank into a house, do not be overly influenced by war movies. Take off .50 caliber machineguns and wind sensors, close the ballistic shield, and depress the main gun before you decide to crash through a wall. More important, first check to see if the house has a basement! Needless to say, this practice is highly discouraged during peacetime. Growing urbanization in Europe may call for an alteration of USAREUR paint schemes sometime in the near future.

When do you need to fully camouflage a tank? seems to be the most frequently asked question. The chart below may be used as a guide to avoid the wasted times when camouflage nets are painstakingly erected only to receive the order to move out in five minutes:

Battlefield Location	Against Air Threat	Against Ground Threat
Deep Attack	Yes	No
FLOT	No	Yes
Battalion Area	Yes	Yes
Fwd of Bde Rear	Yes	Yes
Fwd of Div Rear	Yes	No
RACO	Yes	No

When do you use nets?

- **Air Parity exists** - if you are immobile in a relatively open area for one hour or more.

- **Enemy Air Superiority** - if you are in a relatively open area for more than 30 minutes while halted.

- **Friendly air superiority** - why change history? Whenever you feel you wish to avoid enemy artillery fires.

If these time frames are revised, then perhaps they may be revised downward for wartime and upward for peacetime (realism versus training value).

We must devise a training program to correct our shortcomings in this area. We need to teach our soldiers how to do it, noncommissioned officers how to supervise, and officers how to check their efforts. How many lieutenants know that the camouflage screen, when erected over a vehicle, should be 12-18 inches away from the object it is concealing? Those deficiencies that

are the most prevalent should have the most corrective emphasis.

Common shortfalls include the tendency to camouflage against ground or air detection but not both, when and how to put up nets, how to fight from a camouflaged position, prep-to-fire checks, and compromising the job after it has been done. Many tankers don't know how to put camouflage materials on that will stay on when their vehicles are moving. All these things occur on a daily basis during field exercises. The mentality that the Combat Arm of Decision and shock action does not NEED to camouflage, needs to be dispelled, and soon.

How can commanders institute an effective camouflage program? By teaching soldiers how and why they should camouflage. The following principles should apply:

- Take combat-loaded vehicles down range on gunnery exercises to teach prep-to-fire in conjunction with camouflage.

- Have enough nets to conceal each company effectively. Commanders frequently inspect screening systems. If you operate in an area that experiences snowfall during the winter months, an additional set of snow camouflage netting will prove worthwhile. (It's Class IX.)

- View positions from the enemy's perspective to correct deficiences. Do not allow mistakes and bad habits to go uncorrected.

- Insist on high standards. Encourage ingenuity. Use common sense and don't acquire camouflage materials from your immediate surroundings.

- Change to suit the environment. Break up man-made outlines.

M113 with nets erected blends into nearby tree during NATO exercise.

- Understand how shadows, dust, and camouflage paint deceive the human eye's perception.

- Learn to fight from under camouflage nets.

The goal of all commanders should be to prove the dictum "if you can be seen, you can be hit, if you can be hit, you can be killed" by first denying the enemy visual acquisition. This denies the enemy the initiative in many cases. Because no known armor can totally defeat attack, and speed in itself is no guarantee of survival, armor leaders should enforce a common-sense program of concealment for all combat and combat support vehicles, be they moving or stationary. This will help preserve the force and contribute to its ability to continue the mission. This relatively inexpensive combat multiplier may prove to be the difference between success and failure in some future tactical engagements.

Captain Mark J. Reardon was commissioned in Armor from Loyola College of Baltimore in 1979 and is a graduate of the AOBC, Airborne and Ranger courses. He served with 2d Armored Division as tank platoon leader, scout platoon leader and company XO. He attended the AOAC, motor officer course, and the joint firepower course and was assigned to 2d Infantry Division as battalion S3 (Air) and a company commander. At the time he wrote this article, he was assigned as a combat development analyst with the Concepts Branch, Fort Rucker, Al.

Combat Vehicle Crew Reconstitution

by Captain Russell M. Shumway

"Those problems we faced in strenghtening our armed forces were far more complicated than those of the enemy... Tanks of ours that had been badly hit underwent major repair in workshops in the rear and were returned to active duty.

"More serious still was our manpower problem. As noted, over half of our casualties were men of the Armored Corps, and now we badly lacked tank crews to operate the tanks that began to accumulate. The only way was to train new teams, and fast. But how to do this when all of our armor was dispersed over the fronts and on high alert?...

"I felt that we must not waste time. I had to look at the situation not only as a division commander but also, again, as commander of the Armored Corps, and find solutions for manning the tanks and restoring our armored formations... Even though we were on high alert, we had to train ourselves and train new crews. Since we could spare neither instructors nor tanks, I decided that each tank crew would take a new crew and train it on the spot... Initially, they would train on our tanks, and when we got new tanks, they would continue on those. There was no choice. We would train on tanks loaded with ammunition and at the same time remain on high alert. The fighting might resume at virtually any moment.

"We worked out an 'austerity' program and engaged in only the most essential elements in each training phase so as to advance to the following phase and arrive at the ability to run a tank as soon as possible. True, the training might be faulty from a professional point of view, but an emergency situation obligated emergency training.

"So the brigades deployed and spread out, seeking training areas. Training tents went up, aids were improvised, and school began."

Put yourself in the position of that Israeli division commander. Can you plan a replacement strategy to fill the turrets of your tanks and Bradleys? Are the solutions used in the Sinai in 1973 applicable today?

Given vehicle replacements, can a combat unit sustain itself without outside assets for a reasonable amount of time in combat? Assuming for a moment that this is possible, what sacrifices and tradeoffs must be made in order to re-crew combat vehicles? Is it possible to set up a scenario in which the replacements can be found internally?

The 2nd Armored Division (Forward), because of its geographical isolation in northern Germany, studied this problem. It appears very likely that crews, not vehicles, will be the limiting factor, at least initially, in the next war. Given that, it will be necessary to design a system to replace those crews in order to maintain combat effectiveness.

In order to reduce this to a manageable scenario, certain assumptions must be made. As a test case, the study was performed using full MTOE strengths for the 2nd Armored Division (Forward) as it is currently stationed in northern Germany.

- The unit was committed to a short-notice conventional war in Europe. The logistics base is immature, and little or no deployment preparations have been made in CONUS (i.e., there is no draft, and training centers have not yet begun turning out replacements).

- The unit will be committed to an arbitrary 10 days of combat. The scenario is as follows:

Day 1-Transition to war
Day 2-Move to occupt TAA
Day 3-Deliberate defense
Day 4-Deliberate defense
Day 5-Relief in place
Day 6-Tactical assembly area
Day 7-Hasty attack
Day 8-Hasty attack
Day 9-Hasty defense
Day 10-Deliberate defense

- Crews will obviously take casualties. Implicit in this is the assumption that many crewmembers will be killed, while their vehicle is either undamaged or repairable.

- Only qualified personnel will be selected to replace killed or

"Casualties will obviously be taken among crews. Implicit in this is the assumption that many crewmembers will be killed while their vehicle is either undamaged or repairable."

wounded crews. No noncombatants nor personnel with disqualifying profiles will be used. Critical logistics personnel also will not be used (e.g., no mechanics or support platoon drivers.) While this is, of course, a judgement call, certain MOSs are more critical to sustaining the fight over a short period than others.

The basic approach is five-fold. First, it is necessary to identify the available pool of resources from which replacements can be trained. Next, we must determine the essential skills, by position, that must be trained in order to replace a lost crewmember. A training test will verify the time required to train replacements. After determining a replacement strategy, the final step is to estimate the losses and to match them to the available crews.

Identify Resources

Without yet determining an actual strategy for replacing losses, first estimate the available resource pool. Make the estimate as broad as possible to maximize options.

As most tankers know, almost anybody can be trained as a loader. Therefore, anyone physically capable of lifting and handling a round is probably eligible. More specifically, 11-series, 12-series, 13-series, 19-series, clerks, and cooks are all capable of being trained.

For drivers, both tank and Bradley, previous track driving experience is desired. The available pool, however, looks almost exactly like that for loaders, i.e., virtually anyone who meets the standards in our basic assumptions.

In contrast, a gunner should already have some basic turret experience. Tank units can choose excess 19-series within the unit or possibly find a Bradley gunner somewhere and cross-train him. Bradley-equipped units can use assistant squad leaders, who should already possess some basic turret training, or pull a tanker or a TOW gunner. Both units could probably use Combat Engineer Vehicle gunners or some 13-series men.

One would only replace a track commander from outside the unit as a last resort. While some will maintain that the TC is not as important as the gunner, the TC has to fight and employ the entire tank as a system integrated into a platoon. He must have some basic leadership and command and control experience. The pool here begins with tank and Bradley gunners and assistant squad leaders. In most units, there are avilable infantry and armor officers and NCOs in staff positions, from company master gunners to brigade and division primary and assistant staff officers. It is also probably possible to train other combat arms officers and NCOs to fill the turret.

Determine Essential Skills

Because the basic concern is to field a quick and dirty crew in order to return a vehicle to the fight, the emphasis here is only on the basic and essential skills necessary to put a soldier into a position where he can function. The Army has set training standards for a combat-ready crew. These can be summarized as the completion of a qualification gunnery (Table VIII), and a maneuver training exercise to ARTEP standards focused on the unit's Mission Essential Task List (METL). A reasonable assessment of the training time required is 3-4 days for the ARTEP, and 3-4 days for the crew to fire Tables VI-VIII.

The focus of this study, however, is on the reconstitution of crewmembers while in combat. It is unlikely that the training time or resources will be available while in combat, so the emphasis in this study will be on the minimum essential skills required. The crew, of course, will need collective training to function effectively, but this would be necessary even if a fully qualified crewmember was available. This is precisely the approach taken by General Adan in 1973.

A loader's basic job in combat is to keep the main gun loaded at all times. All other duties - target acquisition, manning the loader's M240, PMCS, etc. - take second priority. Therefore, the essential skill to train is to load the gun. This, of course, also requires that he be able to identify and perform basic maintenance on ammunition. He must be familiar enough with the breechblock to be able to do simple maintenance and emergency actions. Finally, he should be able to operate his M240 for local security. The initial estimate of the time required for this training is a half day.

Drivers must be able to start and operate the vehicle. They need to know the gauges at least well enough to warn the TC of any malfunctions and to keep an eye on the fuel level. They need to be familiar with tactical driving (although the

TC can direct them a lot on this). Finally, they need a basic knowledge of crew drills so they understand exactly what is meant by "Sagger!" or "Driver, move out! Gunner take over." Again, a half day is probably not an unreasonable estimate for this training.

To train a gunner is more difficult. First, he must be able to prepare and operate the gunner's station. Drills must reinforce this until he can find the switches without taking his eyes from the sight, or both hands off the cadillacs.

He must know fire commands and crew drills. He must receive training on the doctrinal specifics of his weapon system (i.e., Bradleys shoot burst-on-target gunnery, while tanks do not). He must be able to perform the gunner's portion of boresighting, and he should have some familiarity with degraded gunnery techniques, especially if he is to shoot from a battle-damaged vehicle. The training estimate for a gunner is two days.

TCs need to be knowledgeable in command, control, and communications (C3), and leadership. To look at the available resources pool, however, one can assume he will already possess these qualifications. As to his specific duties, he will have to be trained or retrained on crew drills, fire commands, and degraded (3-man) gunnery. The estimate for a TC is two days, putting him through essentially the same training as the gunner.

FIGURE 1.

Replacement Strategy

CONDITION	ACTION	PERSONNEL	TRAINING	TRAINER	TIME
M1A1					
LOADER	3-MAN CREW TRAIN REPLACEMENT	ANY SOLDIER	LOAD GUN, AMMO, BREECH, M240 CREW DRILLS	GUNNER	1/2 DAY
DRIVER	3-MAN CREW AND MOVE LOADER TRAIN REPLACEMENT	ANY SOLDIER w/TRACK DRIVING EXPERIENCE	OPERATE VEHICLE TACTICAL DRIVING CREW DRILLS	TC OR GUNNER	1/2 DAY
GUNNER	3-MAN CREW AND MOVE LOADER TRAIN REPLACEMENT	19K PREFERRED 11 SERIES	GUNNER'S STATION CREW DRILLS M240 BORESIGHTING DEGRADED GUNNERY	TC	2 DAYS
TANK COMMANDER	3-MAN CREW AND MOVE GUNNER TRAIN REPLACEMENT	19K (GUNNER) ARMOR OFFICER OR NCO	LEADERSHIP CREW DRILLS DEGRADED GUNNERY	PLATOON OR COMPANY ASSETS	1/2-2 DAYS
M2 Bradley					
DRIVER	TRAIN REPLACEMENT	11M10 PREFERRED ANY SOLDIER w/TRACK DRIVING EXPERIENCE	OPERATE VEHICLE TACTICAL DRIVING CREW DRILLS	BC OR GUNNER	1/2 DAY
GUNNER	ASL 2-MAN CREW TRAIN REPLACEMENT	ASL PREFERRED 11M10/20 OTHERS WITH TURRET EXPERIENCE	GUNNER'S STATION CREW DRILLS BORESIGHTING DEGRADED GUNNERY	TC	3 DAYS
BRADLEY COMMANDER	ASL 2-MAN CREW & MOVE GUNNER TRAIN REPLACEMENT	ASL GUNNER MASTER GUNNER, IN OFFICER OR NCO, OTHER COMBAT ARMS	LEADERSHIP CREW DRILLS DEGRADED GUNNERY	PLATOON OR COMPANY ASSETS	1/2-2 DAYS

Validate Training

To validate the training estimates. two hybrid crews were prepared and trained at Grafenwoehr. The M1A1 was crewed by two 11M10s (driver and loader), a 19K10 with no turret experience (gunner), and a 13B40 TC. The M2 crew consisted of two 11M10s with no previous experience (gunner and driver), and one 11H30 vehicle commander.

The normal vehicle crews conducted the training. At the conclusion of the training, actual rounds were fired in a modified Table VI. The validation test led to these conclusions:

- Drivers (M1/M2) and loaders (M1) can be trained by experienced crew members in a half day. The level of proficiency is slightly below that of a school-trained soldier.

- An M1 gunner can be trained to maintain and operate the primary weapon system within two days if he is an M1 crew member moved to the gunner's slot.

- You cannot train a Bradley Fighting Vehicle gunner within two days due to the limited turret experience of the resource pool. A man can learn the basics to put steel on target in three days, but

FIGURE 2.
Available Replacements

M1A1

CONDITION	ACTION	REPLACEMENT POOL	PERSONNEL	NUMBERS
LOADER	3-MAN CREW TRAIN REPLACEMENT	ANY SOLDIER	CLERKS, COOKS, ETC.	250
DRIVER	3-MAN CREW AND MOVE LOADER TRAIN	ANY SOLDIER WITH TRACK DRIVING EXPERIENCE	19K LOADERS 19d (1 PER M3) 13b (1 PER M109) 12b (FROM DS PLTS)	116 18 18 20
GUNNER	3-MAN CREW AND MOVE LOADER TRAIN REPLACEMENT	19K PREFERRED 11SERIES	19K LOADERS	116
TANK COMMANDER	3-MAN CREW AND MOVE GUNNER TRAIN REPLACEMENT	19K GUNNER ARMOR OFFICER OR NCO	19K (GUNNERS) AR OFFICERS/NCOs	116 50

M2 BRADLEY

CONDITION	ACTION	REPLACEMENT POOL	PERSONNEL	NUMBERS
DRIVER	TRAIN REPLACEMENT	11M10 PREFERRED ANY SOLDIER WITH TRACK DRIVING EXPERIENCE	11M10 DISMOUNTS	250
GUNNER	ASL 2-MAN CREW TRAIN REPLACEMENT	ASL PREFERRED 11M10/20 OTHERS WITH TURRET EXPERIENCE	11M (ASL) 36 11H (2 PER ITV) 12 12F 91 PER CEV) 2	
BRADLEY COMMANDER	ASL 2-MAN CREW AND MOVE GUNNER TRAIN REPLACEMENT	ASL GUNNER MASTER GUNNER IN OFFICER OR NCO, OTHER COMBAT ARMS	11M (ASL) 36 MASTER GUNNERS 18 IN OFFICERS 12	

must have additional manipulation training.

- Vehicle commanders can get familiarized with the commander's station and the vehicle's capabilities within a half day.

Additional requirements, such as fire control and distribution, are resource-pool dictated. If a gunner moves to the commander's station, training can be accomplished in one day. If a non-experienced commander is in that position, training takes take two days with additional manipulation training.

- Training time, of course, will increase rapidly as the pool of trainers is attritted.

Determine Replacement Strategy

Figure 1 shows some possibilities to replace injured or killed crewmen. The table includes the personnel pool, required training, and the trainers. This table is not intended to be all-inclusive; rather, there are many possible methods to replace soldiers.

Given this basic strategy as a starting point, it is now necessary to estimate the numbers of available crews to replace those lost in combat. Figure 2 shows one estimate, staying within the guidelines stated above (i.e., no noncombatants).

Again, this table illustrates only some of the many possible courses of action to replace injured or killed crewmen.

Estimate Losses

The next step is to estimate the losses and match them with the available replacements. Data from Table 7-7, FM 101-10-1 were modified in order to make those estimates. Because the manual does not address all of the information required, we make certain assumptions:

- M2 losses will be the same as tank losses for a similar scenario.

- Attack attrition rates are the mean between delay and defense rates.

- The rate of maintenance returns will be lower than the 80 percent shown in the manual.

The actual return rate was estimated at 60 percent, due to the immature log base. The attrition rates are all-inclusive; they include maintenance failures, crew failures, and losses due to combat. Figure 3 gives a summary of the modified attrition rates.

Conclusions

When one compares projected losses with available crews, one finds that there is a minimum of 116 available tank crews and 50 Bradley crews. The limiting factor in both cases is gunner replacement. It is

FIGURE 3. Loss Rates

	DELAY			DEFEND		ATTACK	
	LIGHT	MODERATE	HEAVY	MODERATE	HEAVY	MODERATE	HEAVY
1ST DAY	12%	30%	73%	22%	54%	26%	63.5%
2ND DAY	13%	18%	8%	12%	14%	15%	11%
3RD DAY	6%	11%	6%	6%	10%	8.5%	8%

Using these estimates, the cumulative loss estimates are:

DAY	TANK LOSSES	BFV LOSSES
1	0	0
2	0	0
3	10	7
4	16	11
5	16	11
6	16	11
7	28	20
8	35	25
9	45	32
10	51	36

Figure 3 shows projected loss rates in delay, defend, and attack scenarios, broken out for different levels of fighting.

not hard to visualize a scenario in which replacement or repaired vehicles are available, while trained crews are not. While not addressing every possible circumstance, the study shows - on a gross scale - that it is possible to re-crew vehicles to sustain combat for a limited period. The factors of METT-T must dictate whether a certain soldier is more valuable to the mission in his MOS or as a tank or Bradley crewman. A commander could decide, for example, that he needs Bradleys more in a defense in the desert than he needs dismounted infantry, or that his dismounts are more valuable in a MOUT scenario than a few additional tanks might be.

Additionally, history and lessons learned at the National Training Center both show that the largest number of casualties will be among commanders and leaders. For example, one brigade in the 1973 Arab-Israeli War lost more than 90 percent of its commanders and platoon leaders. None of the company commanders survived the first day.[2] The next war will reaffirm that commanders and platoon leaders are especially hard hit, and that staff officers and NCOs at all levels are potential replacements.

In addition, the study reinforces a rule of thumb long known to the armor community, that cross-training of all crew members in all positions is a key individual skill on which to build combat-ready crews and platoons.

The bottom line in most units in combat probably will be a compromise between a full replacement program, as outlined here, and merely accepting losses. Those vehicles that can be recrewed without seriously degrading other capabilities will be, while others will lack soldiers to fill repaired vehicles.

A strong cross-training program increases the commander's options in war and builds professional excellence in peace. It deserves to be a vital part of a unit's training program to support its Mission Essential Task List.

Notes

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Captain Russell Shumway was commissioned as a Distinguished Military Graduate in 1983 from the University of Pennsylvania. He has served as a tank platoon leader, company XO, support platoon leader, S3-Air, and assistant G3 training officer in the 2nd Armored Division (Forward), Garlstedt, West Germany. He is currently attending the Armor Officer Advanced Course.

The Return of the Gunned Tank Destroyer

At left, the Centauro wheeled tank destroyer, armed with the NATO 105-mm tank cannon.

An Analysis of the Soviet Armored Threat, Current Antitank Technology, and Doctrine.

by First Lieutenant Steven R. Witkowski

Presently, there are no antitank cannons in the U.S. Army inventory, except for those mounted on its main battle tanks. Weapons that rely on chemical energy (HEAT) warheads to defeat heavy armor dominate NATO's antitank defense in the form of thousands of ATGM launcher platforms.

As Soviet MBT armoring techniques continue to improve, even planned missile warheads will be hard-pressed to defeat the frontal armor of future threat MBTs. Only kinetic energy penetrators, fired by high-pressure cannons, demonstrate the potential to defeat projected threat armor arrays.

This superior armor-defeating capability, combined with a high rate of fire, and the long-range accuracy modern fire-control systems afford, make the cannon a far more lethal antitank weapon than current ATGMs. A dangerous imbalance currently exists in the Army's antitank inventory. We must take action now to acquire a versatile, cannon-armed tank destroyer to effectively deal with this threat of numerous, well-armored Soviet MBTs.

The Threat

When the Soviets fielded reactive armor on their first-echelon MBTs in the mid-1980s, the death knell sounded for NATO's first line of antitank defense. After relying for so long on its much-vaunted ATGMs, these weapons now seem to amount to so many expensive, high technology fireworks. Tests on Israeli Blazer reactive armor have demonstrated that kits applied to M60 tanks can fully dissipate the attack of an AT-3 *Sagger* warhead from almost any angle in the frontal arc, and can disrupt strikes on the turret sides at detonation angles of 60 degrees or greater. This casts doubt on the ability of any weapon equipped with a single HEAT warhead, regardless of size, to penetrate the frontal arc of a reactively-armored MBT.

Additionally, the Israeli manufacturer of Blazer armor, Rafael, claims nothing short of a HEAT jet can initiate its reactive armor. According to the company, the armor is immune to sympathetic detonation.[1]

Even before the fielding of reactive armor, there have been questions about the ability of current Western ATGMs to penetrate the frontal armor of Soviet MBTs. Experts have long been held that the Soviet T-64, up-armored T-72M1 "Dolly Parton," and the T-80 employ a form of composite armor. The exact structure of this composite armor is unknown, but the threat that U.S. AT forces must face will only increase with the fielding of the Follow-On Soviet Tank (FST-1). The experts expect this vehicle to employ a ceramic or glass-laminate armor, much like the West's Chobham armor.[2] Composite or laminate armors defeat HEAT jets by presenting them with a matrix of materials with differing yield strengths. The materials re-direct the HEAT jet and attenuate it as it seeks the path of least resistance through the structure.

Possible Countermeasures

Some experts argue that several ATGMs already in production, or under development, can effectively defeat reactive- and/or laminate-armored MBTs. These countermeasures include two HEAT warheads in tandem; the first detonates the reactive armor, allowing the

main warhead to reach the tank hull undisturbed (TOW 2A).

Another option employs top attack on the thinner armor of the deck and roof. These weapons carry either conventional HEAT warheads (Bofors BILL) or explosively-formed-projectiles (EFP), the system used on the TOW 2B. Unfortunately, proponents of these weapons seem to forget the ease with which simple armor modifications could overcome the vulnerabilities these weapons seek to exploit. It would be relatively simple to arrange the reactive armor plates to protect against top-attack missiles or to create a double-layer design to defeat tandem warhead attacks. This capability already exists to a certain extent in the reactive armor arrays that cover the T-64 and T-80.

Explosively-formed projectiles are easier to defeat because of their poor armor penetration, when compared to equivalently-sized HEAT warheads (Approximate EFP penetration equals the dish diameter, while a HEAT warhead penetrates to six times the cone diameter.)

A simple additional armor array, added to the turret roof, could prevent the penetration of EFPs; the non-metallic "blankets" on the turret roof of many Soviet T-64 and T-72 tanks accomplishes the same purpose.[3]

KE vs HEAT Attack

Future threat MBTs may employ an advanced ceramic or glass-laminate armor, much like Chobham, and reactive armor. These armor technologies are designed specifically to defeat HEAT warhead jets. Whether even advanced HEAT warheads can penetrate MBTs employing such armor is uncertain. However, reactive armor has no effect on kinetic energy penetrators, while composites or laminates offer only a moderate improvement over rolled homogenous armor in protection against KE attack. Thus, current 105-mm and 120-mm tank cannons firing APFSDS rounds are still capable of defeating the majority of Soviet MBTs. This situation may not, however, hold true for the future. Because of their compact dimensions and ballistically well-shaped hulls, Soviet MBTs employing conventional armor can afford greater protection levels than Western MBTs for the same weight of armor. This factor, combined with the use of composite armor, and the arrival of the FST-1 with its frontal protection incorporating laminate armor, is what spurred several members of the NATO alliance to adopt the 120-mm cannon as the new standard for their MBTs.

Additionally, five of the NATO members are currently involved in talks with the goal of signing a memorandum of understanding on the next generation of armament for NATO MBTs.

Many experts believe these talks will center on a conventional, solid-propellant cannon with a caliber of 130-140 mm, the consensus being that the 120-mm cannon and its APFSDS ammunition will be only marginally effective against the next generation of Soviet tanks.[4]

We can summarize the situation today as follows:

- Current first- and second-generation ATGMs are now ineffective due to the application of reactive armor to Soviet front-line MBTs.
- Future generations of ATGMs will only be marginally effective against reactive- and laminate-armored Soviet MBTs.
- Current tank-mounted cannons can still effectively defeat the present threat, but this situation will change radically with the fielding of the FST-1 and its successors.

The U.S. Army must field antitank cannons in greater numbers than it currently possesses, and it must seek to replace these weapons in the near future with a new, more capable design. We must deploy these weapons, not only in tanks with armored units, but in AT units which are presently armed with missiles. The only way to do this is with a cannon-armed tank destroyer that will take the place of a number of missile-armed vehicles.

One such possibility is the replacement of the Improved TOW Vehicle company in Bradley IFV-equipped mechanized infantry battalions. Even if we develop a new missile that will defeat the FST-1, a missile weapon system cannot compete with a cannon's rate of fire and general fire-support capabilities. ATGMs possess greater accuracy at extended ranges, but a cannon, slaved to a modern fire-control system with a laser rangefinder, can achieve comparable performance.

Also, when these extended engagement ranges do not exist, the cannon has no equal for dealing with a target-rich environment. What U.S. AT forces need, and have always needed, is a gun/missile mix.

Role of the Tank Destroyer

Doctrinally, tank destroyers perform an economy-of-force mission. Their job is the destruction of the enemy's armored formations. They are designed to carry a fully-capable AT weapon on a light, mobile chassis. Firepower, combined with a rapid positioning capability, allows them to react to and effectively defeat an enemy armored assault.

The accomplishment of their economy-of-force mission depends on their unit cost in comparison to a modern MBT. For the cost of one MBT, the Army can acquire two or three TDs. If we properly employ them, they gain a mobility differential over the enemy's forces. TDs blunt the opposition's armor, while friendly armored formations, released from the defense, go on the offensive, taking advantage of their battlefield maneuverability and shock effect.[5]

TDs are more economical than tanks because their defensive mission does not require them to advance under fire, so they can accomplish their mission without the expense and technological complexities of heavy armor and the suspension systems to support it, stabilized fire control systems, and, in the case of ATGM-armed vehicles, recoil and turret mechanisms.

Because of their effectiveness, low cost, and light weight, ATGMs have been the weapons of choice for tank destroyers. Vehicles such as the UK's Swingfire-armed FV 438, Germany's HOT-equipped Jaguar, and the U.S. Improved TOW Vehicle are typical examples of TDs on light, mobile, and relatively inexpensive chassis. Now, with the need to augment current ATGM-equipped AT forces with guns, such vehicles are no longer adequate to their assigned missions.

Options and Requirements

The adoption of a cannon-armed TD will not be an easy decision, and once the Army decides to procure these weapons, there are several major doctrinal, technical, and economic choices that must follow. Will the weapon be wheeled or tracked? What will be its level of armor protection and weight limit? Will it have a turret or hull-mounted weapon? What is the weapon system supposed to do? The solution proposed here stresses low cost and simplicity in order to maximize the TD's cost effectiveness over an MBT.

Technology still limits designers to the conventional, solid-propellant, high-pressure cannon to effectively propel a long-rod, kinetic-energy penetrator at sufficient velocity to penetrate an MBT target. Technologies such as electromagnetic rail guns, liquid-propellant guns, and hypervelocity missiles are still not mature enough for battlefield application. Power generation and storage problems persist in rail-gun designs, unstable propellant combustion rates complicate liquid-propellant, and hypervelocity missiles still cannot match the velocity of an APFSDS round.[6]

Towed AT guns would be the cheapest way to obtain more APFSDS-firing AT cannons. While these weapons would be extremely mobile on a wheeled transporter, this type weapon would have a limited survival rate on the modern battlefield because of the Soviets' artillery.

A tank destroyer must have some minimal level of armor protection against HE fragmentation if it is to survive an initial artillery preparation. It must also be relatively mobile so that it can rapidly shift firing positions, once an engagement ensues. Any weapon system that cannot move rapidly, such as an AT gun, will be destroyed once the enemy discovers its position. A turret for a defensively-oriented TD represents a quantum leap in manufacturing complexity and expense. A hull-mounted weapon, with a limited traverse of ten degrees left or right of center, is more than sufficient for the vehicle's mission of awaiting an enemy attack along a known axis of advance.

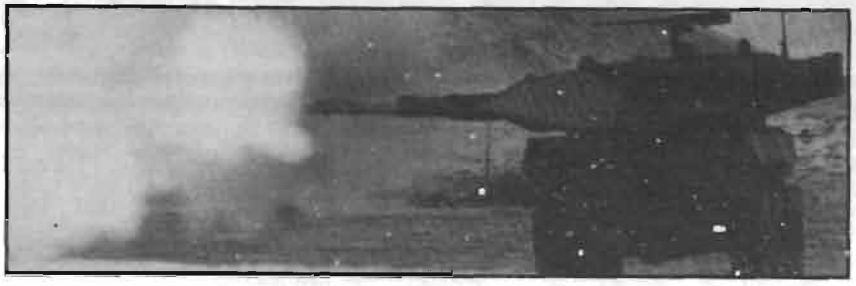
If this vehicle is to be cost-effective, its weight and dimensions must allow it to be used not only by U.S. forces in Central Europe, but also by airborne and light division AT units. In this case, the same standards that exist for the Army's Armored Gun System (AGS) program will also serve. It must be air-transportable by C-130 aircraft and be compatible with the Low-Altitude Parachute Extraction System (LAPES). This requirement imposes an upper weight limit of 22 tons.

The last major issue in selecting a gunned tank destroyer is the choice of a wheeled or tracked chassis. A tracked vehicle would offer the advantages of better off-road mobility and greater stability to deal with the recoil forces of high-pressure cannons.

Wheels offer greater road speed and simplicity over a tracked suspension. Three recently developed TDs: the Italian B-1 Centauro, Brazilian Engesa EE-1E, and the Cadillac Gage V-600, demonstrate that a lightweight, wheeled chassis can serve as the firing platform for an MBT cannon. Long-recoil systems and high-efficiency muzzle brakes can help reduce this problem. These "soft-recoil" technologies can reduce the recoil force of a 105-mm cannon into the 11-20-ton range, with no degradation of ballistic performance. This allows these vehicles to have weights in the 18-21-ton range.[7]

Current Programs

The Armored Gun System program has existed under several names, and with different requirements, since 1980, but a lack of funding has curtailed the program



Above, Cadillac-Gage V-500 with soft-recoil 105-mm gun.

Wheeled Tank Destroyers

The LAV, a wheeled armored vehicle used by the Marines, has been tested with a 90-mm high-pressure gun, as seen here. A 105-mm low-recoil mounting is also to be tested.

Frontal view of the Centauro, an Italian-made, eight-wheeled tank destroyer with 105-mm standard NATO cannon.

since its inception. The current goal of this program is to field the XM-4 light tank; this vehicle is to act as a MBT surrogate for the nation's light forces. It must possess all of the attributes of an MBT, with the exception of heavy armor. The current contenders for the program include Teledyne Continental's AGS, the FMC CCVL, Cadillac Gage Stingray, and the Swedish-built Hagglunds IKV 91-105. These vehicles all possess turret-mounted, long-recoil 105-mm guns, stabilized fire-control systems, and, in some cases, an automatic loader. Because of their offensive mission, these vehicles must make up for their lower protection levels in agility, target acquisition, and hit probabilities that are equal to, or greater than, their MBT adversaries.[8] Their resulting cost and complexity places them at the most undesirable end of the TD solution scale. They exist as a special class of light tank, and it would be prohibitively expensive to field them as TDs across the U.S. Army.

The U. S. Marine Corps is currently focusing its efforts on the Light Armored Vehicle Assault Gun (LAV-AG) program. This program began in 1978 as the Mobile Protected Weapons System (MPWS). After years of changing goals, concept debates with the Army, and a lack of funding, the current program aims at equipping a Marine LAV with a turret-mounted, general support/antitank gun. A request for industry proposals is due in the near future, and the competition is presently open to weapons of 75-mm and larger. A soft-recoil 105-mm cannon-armed turret is an easily conceivable goal for this program. This solution is most interesting, for it could easily meet all of the requirements for a U.S. tank destroyer, as laid out previously. The LAV is a standard chassis already in mass

production, and there are a number of 105-mm long-recoil turrets currently on the market that would fit it. A multipurpose U.S. tank destroyer based on the LAV would undoubtedly offer the best solution from the standpoint of low unit cost and commonality of equipment.

Other NATO nations have also recognized the need for gunned TDs. As West Germany plans for the future upgrade of its armored forces, one requirement calls for the development of a 120-mm cannon-armed antitank vehicle. This vehicle is to be the main antitank weapon system of armored infantry units, a role currently filled by Milan ATGMs mounted on Marder IFVs.[9] No definite specifications for this vehicle exist yet, and all funding for its development has been cut to meet Bundeswehr budget constraints. However, this does not preclude the selection of an austere version of the Leopard II, or an up-gunned 120-mm-cannon-armed Leopard I, in the future. These German solutions to the gunned TD requirement focus on the heavy end of the scale because the Germans have no requirement for global deployment.

Italy, on the other hand, has taken the lead in this area with the fielding of its B-1 Centauro eight-wheel tank destroyer. At 21 tons, it is equipped with an OTO Melara long-recoil 105-mm gun in an unstabilized turret. The Italian Army rejected a stabilization system and an automatic loader on the grounds of cost and complexity. The chief requirement that drove the development of this tank destroyer was that the vehicle carry the same armament as the great majority of MBTs in service in Italy, and in NATO in general, but with substantially reduced acquisition and running costs.[10] This vehicle is a true example of what can happen when an army accepts the tradeoffs associated with a limited-capability vehicle and decides to acquire. As a result, Italy is currently in possession of a vehicle that could easily fulfill the needs of the U.S. mechanized and airmobile AT forces, while U.S. programs remain paper-bound.

By basing its antitank defenses on missile systems, the U.S. Army critically weakened its ability to deal with enemy tank attacks. The introduction of reactive and composite armor on current generation Soviet tanks, and the pending arrival of the advanced armored FST-1 have collapsed this hollow defense completely. Even advanced missiles will be hard-pressed to close the gap.

Conventional cannons firing kinetic energy penetrators are the only feasible solution to this problem in the near future. They must be acquired in great numbers to augment the Army's antitank defensive forces. The best solution would be a gunned tank destroyer emphasizing simplicity and cost effectiveness, based upon a limited defensive role. Additionally, it should be deployable by both heavy mechanized and light forces.

The 105-mm cannon will meet the short-term requirement, but efforts must be made to up-gun to at least the 120-mm standard in the near future. The technology to do this exists; the will to accomplish the mission must be forthcoming, or the United States could be caught short, not only in a European scenario, but also in any conceivable Third World involvement.

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First Lieutenant Steven Ray Witkowski was commissioned in Armor from the United States Military Academy in 1985. He attended the Armor Officer Basic Course and was assigned to the 2nd Armored Division (FORWARD) in the FRG. He served as a platoon leader in A Co., 2-66 AR and D Co., 2-66 AR, where he helped train for the 1987 Canadian Army Trophy competition. After participating in the CAT competition, he served as executive officer of C Co. before attending the Armor Officer Advanced Course in January.

"Your Mission Is to Contact the Ru

by Captain William A. Knowlton

(Reprinted with permission from "Reader's Digest," August 1945.)

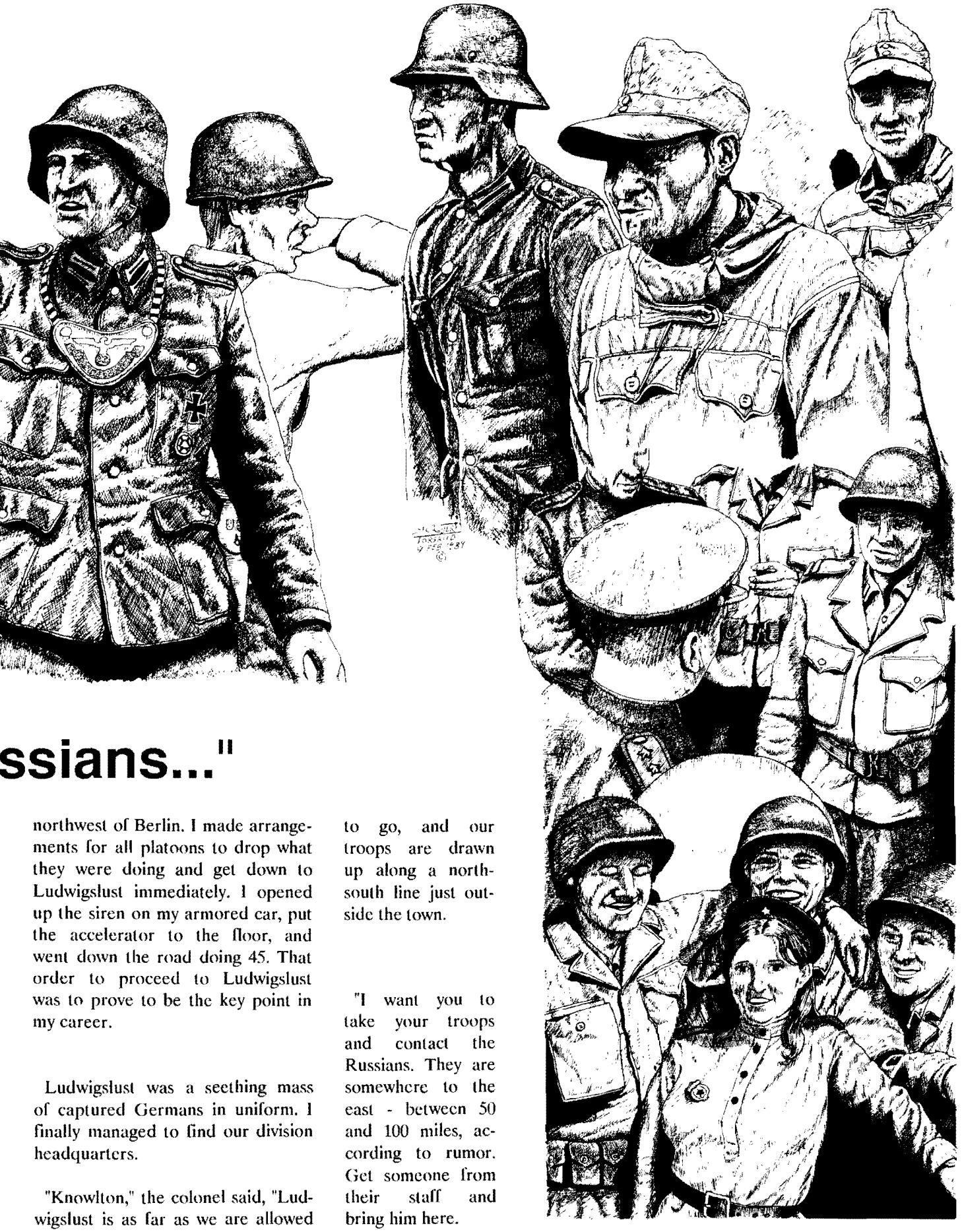
One of the most fantastic episodes of the whole war occured shortly before V-E Day when a young lieutenant of the Seventh Armored Division was ordered to advance with his reconnaissance troop beyond the American lines to find the Russians. This 24-year-old West Pointer never guessed that, with fewer than 100 men, he would have to bluff his way over 60 miles through the whole German 12th Army.

Cut off from communication with his headquarters, plunging forward because he dared not admit his weakness by turning back, Lieutenant Knowlton achieved the disarming of thousands of German troops and the surrender of several German towns.

His breezy narrative, written in a letter to his wife and not intended for publication, is packed with drama, suspense and a sense of high adventure, and is spiced with humor typically American. The climax comes with his vociferous and convivial meeting with our Russian allies. His story follows.

It was while I was running prisoner escort, and had just sent my platoons way back out of radio contact, that Sully* got through to me. "Hey, Bill," he said. "Headquarters has been trying to raise you. Get down to Ludwigslust immediately, they have another mission for us." I swore to myself. We had been on the move all night crossing the Elbe through wind and stinging rain blowing down from the Baltic, and then since dawn had been on a reconnaissance mission ahead of the task force, which had just taken Ludwigslust on the plains

*Knowlton's fellow officers on this expedition were: Lt. William Sullivan (Sully), Lt. Earl Harrell, Lt. Harry Clark and Lt. Henry Temple.)



ssians..."

northwest of Berlin. I made arrangements for all platoons to drop what they were doing and get down to Ludwigslust immediately. I opened up the siren on my armored car, put the accelerator to the floor, and went down the road doing 45. That order to proceed to Ludwigslust was to prove to be the key point in my career.

Ludwigslust was a seething mass of captured Germans in uniform. I finally managed to find our division headquarters.

"Knowlton," the colonel said, "Ludwigslust is as far as we are allowed to go, and our troops are drawn up along a north-south line just outside the town.

"I want you to take your troops and contact the Russians. They are somewhere to the east - between 50 and 100 miles, according to rumor. Get someone from their staff and bring him here.

"The German 12th Army lies between you and the Russians," he continued. "If you get into trouble we can send you no help. Do not get too entangled and let me know your progress. Good luck to you."

He shook my hand, which both touched me and made me a trifle apprehensive. You shake hands with people you don't expect to see again for a long, long time, and I didn't like it.

Lieutenant Knowlton briefs Troop B on its historic mission - to cross the Elbe and link up with the advancing Russians.

To make speed, I decided to leave my assault guns behind. Harrell's platoon was off on another mission, so I started with only two platoons, less one section, and three headquarters armored cars. I put Clark's car in front, a mess of peeps, my car, a few peeps, Sully, and then the rest of the first and third platoons. Altogether we were about 65 men.

I looked at the map. I could snoop along the back roads and take my chances fighting, or I could barrel right down the main road as though an army was following me and hope no one would shoot. I decided to barrel down the main road, and so we started off.

This was the mission of the war, and my heart was singing as we swung out onto the road. But my heart was pounding a little, too, for this could be a nasty mess, as we found out later.

We soon passed through the American lines. The road beyond was jammed with German troops retreating to the American zone. They were mostly drunk, and upon seeing us they would shout and throw down their weapons. That gave us the keynote for the situation, and we went faster. The crowd started thinning out, and soon we were hitting open stretches before sighting the next group. Each time there would be a tense moment. The Germans would aim their guns, then stop, puzzled as to why we stayed seated up on top of the turrets and made no move for our guns, and finally they would decide that we must be a helluva big force to behave that way, and throw down their weapons.

After traveling 10 kilometers we reached Neustadt. The streets were jammed with civilians and soldiers, just as though it was a holiday. The crowds were singing, and everybody was very jolly. The soldiers laughed and waved when they saw us, and held up *Panzerfausts* for us to see, then threw them away. It was contagious. As soon as one soldier threw away his weapon, everybody did.

It took us almost two hours to go through Neustadt, and we finally resorted to directing traffic ourselves. I got hold of a German SS lieutenant, and had him organize a traffic force from the SS troops in town. It was worth the price of admission to see the faces of the German soldiers as they drove into town to find SS and Americans directing traffic side by side. We had a circus.

On the other side of town was a thick pine forest through which the road ran. We were held up by a snarl of broken-down trucks, over which soldiers were clambering in search of food and clothes. I began to get a little worried. Several SS came out of the woods, got food, and then went back.

I could see their machine guns, and they looked like a hard bunch, but I called to them to come back out of the woods. They stopped and looked startled, and then ran for their machine guns. I thought we were done for, but I didn't want to fire and bring the whole crowd down on our necks. So we all stayed seated and continued to yell at the SS as though it was inconceivable to us that someone should want to resist the large force that was follow-

"My throat went dry, and my stomach, already tight from the cold, tightened more. I think I must have prayed, but I can't remember a thing except those guns tracking us."

ing us. They came out and gave up their arms.

There were so many weapons that we couldn't possibly break them all. So we finally took the pistols, and told the men to go back 15 kilometers in that direction and turn in all weapons to the Americans there. I promised them that the huge force following us would not fire on them; in fact, I said, they would probably be so well camouflaged that the Germans would not see any of them until they reached the rear areas of Ludwigslust. I lied more in that day than I ever have in all my life.

We reached the end of the forest and started across an open space. My heart sank as I happened to glance to the side. On our flank, about 1,000 yards away, was a battery of four of the hugest antitank guns I have ever seen. I realized that the others had not seen them, so I stayed seated on the turret and acted as though everything was all right. The four guns swung onto our column, started tracking us as we moved. My throat went dry, and my stomach, already tight from the cold, tightened more. I think I must have prayed, but I can't remember a thing except those guns tracking us. Suddenly they stopped, and four heads came up over the parapet. We paid no attention to them. A few more heads came up, and finally, about 45 men came out from the position, throwing their rifles away as they did.

The whole trip continued like that. We would come on a group of Germans, they would aim, we would yell at them to throw down their arms, they would comply, and off we would go. We ran across a lot of tanks - Tigers, Panthers, and assault guns, all complete with crews. After sweating out so many of those damn tanks during the Ruhr pocket, it was like being behind stage at the theater to see those Germans running them. We took the firing pins out and sent them on their way.

It was really something to see Germans throwing away their arms by the thousands - by regiments and battalions. Once a colonel came up the column, stared insolently at me, and ordered all the soldiers to stop throwing away their weapons. One soldier had a bazooka in his arms to throw away, but when the colonel yelled at him, he stopped and looked inquiringly at me. Several other soldiers stopped and watched. It was quite tense. I jumped out of the vehicle, walked up to the colonel, put my hand in his face and pushed hard. Then I turned to the soldier with the bazooka and told him to throw it away. He still hesitated, so I yelled at him in a harsh tone of voice. He grinned and threw the bazooka away. I turned back to the colonel and chewed him out thoroughly, asking him who he thought was running his regiment - he or I.

Parchim was the damndest town I have ever seen. Someone had telephoned ahead that the American Army was coming; so when my little force pulled into town, there were two German MPs on each corner to direct us through. The route was posted for us, and SS kept the crowds on the sidewalks and off the streets. German soldiers lined the road six deep all the way through the city, all cheering loudly. Someone had given them the impression that we were going to fight the Russians.

Finally we came into Lubz, and right there I got as scared as I have ever been in my life. We had just tried to get headquarters on the radio and discovered we were out of contact. So here we were, 40 miles inside enemy lines with about 65 men, in the center of the German 12th Army, and with no prospect of getting out alive if they decided we were not to leave. And here in Lubz we encountered some of the real fighting men of the Wehrmacht, with many SS among them. They sat on mammoth tanks and field artillery pieces, their faces were grim and dirty and bearded, and they kept their guns leveled on us. They were a tough collection and they did not like us.

Ahead of me was a huge general, riding in a staff car with a motorcycle escort of SS troopers. I had to do something or else we were *kaput.* I pulled my armored car over in front of his auto, and casually leaned out, pushing one of the SS machine pistols aside. *"Wo gehen Sie, Herr General?"* I asked.

He turned a raging purple face on me for daring to block. "I can't understand you," he said. "Get out of my way."

"Where are you going, chum?" I said. "I'll get out of your way when I find where you are going."

"I am going to Parchim," he screamed.

"OK," I said. "Just so I know where you are. Driver, pull out of the general's way." We eased over, and the general tore off in a cloud of dust and SS troopers. He turned out to be the corps commander of that sector, but more about that later.

I was feeling pretty good about that time, and I almost died laughing when I saw Sully. He came up from behind on a German MP who was feverishly trying to direct traffic east. Sully tapped him on the shoulder, and the MP looked around to tell him to wait a minute. It was a perfect double take. The MP turned back, started to direct traffic, realized that it was not a German, and turned back with his chin dropping to his chest. Sully placed a hand on each shoulder, spun him around, and started him directing traffic from the east to the west.

A few minutes later, Harrell caught up with us. Then an SS came to me and demanded to know what the Americans were doing here. I told him we were heading a large force, and asked where the Russians were. He told me they were 50 kilometers away. So we had chased 50 kilometers through enemy territory to reach Lubz, and here we were still a hell of a long distance from the Russians.

I tried to reach headquarters again on the radio, but still no luck. By now the SS were crowding around the car and their attitude was definitely hostile. Any more indecision on our part would result in trouble.

There were several courses open. We could go on and meet the Russians, but it was getting dark, and the problem of identifying ourselves came up. The signal was a certain type of flare, of which we had none, and at night they could not see our emblems. Also, as we approached the German-Russian lines, we could expect fire from the Germans. We could turn around and go back, but if we ever showed enough indecision to turn around we were all dead men. That was written in the SS men's eyes. Last of all, we could stay in Lubz and sweat it out all night.

More and more and bigger and bigger artillery pieces were going by, tanks were filling the night air with the noise of clashing steel, German officers were screaming harsh commands - it was one of the most magnificent and yet terrifying sights I have ever seen.

I made my decision. "Sully," I called, "take the troop out of town on top of a hill and see if you can regain radio contact. Sergeant Ladd, come with me." So the troop pulled on, and Sergeant Ladd and I started to elbow our way through the German troops.

As we reached the center of town, a major with a huge potbelly came stumbling down the street with a meek little civilian beside him. "I surrender the town," he sputtered. "The general is not here so, in the name of the general, I surrender."

"I know," I replied. "I just talked to the general. He went to Parchim."

"Oh, good," said the major. "You talked with General Hernlein, then. I surrender the town. This man here is the burgermeister."

The burgermeister mumbled something about a pleasure to see the American Army (meaning Sergeant Ladd and myself) and doffed his hat. I brushed him aside and spoke to the major brusquely. I was so tired that I couldn't see straight, but I tried to sound tough and businesslike. "First, I want a command post."

"Right over here," said the major, "the SS have a traffic control point. It was also a division CP until the generals left."

"Run the SS out and I will use it," I ordered, and so we started through the town, with people leaning out of windows staring, and soldiers pushing up to see the new military commandant. I looked neither to the right nor left, but strode down the street with the major and burgermeister puffing along behind.

The CP, a former bar, was full of SS and parachute officers. I spotted a colonel sitting at a huge table with a map on it. "I'll sit there," I said; and the colonel reluctantly vacated the chair. The other officers stood watching me with steely eyes.

I had to move quickly to continue the bluff. I ordered all civilians off the streets to their homes. German soldiers could pass through the town, but must leave their arms there. I arranged with the burgermeister to turn over the brewery as an arms collection point.

The Parachute Division Hermann Goering, one of the crack divisions of the German Army, was in town; so I organized them as MPs and told them they were to keep traffic moving, to see that all traffic passed by the arms collecting points, and that all troops turned in their arms. They got hot, and in about an hour, traffic was flowing smoothly. I permitted them to keep all large tanks, as there were many soldiers riding on these pieces, and I wanted to get as many as possible back to our lines.

I was really sweating by then. My radio operator came in and said, "Sir, I put that message in for you and here is the answer." I opened his note and read: "Sir, I cannot con-

tact any station - we are cut off from any friendly forces."

"Thank you, Sergeant," I said. "Notify them that I will comply and stay here awaiting further orders." He saluted and left.

I turned to the Germans. "I have just received word from my headquarters that I will remain here for the night and move forward in the morning to meet the Russians."

The five lieutenants of B/87 Cav in 1945: from left, Leo Sher, Harry Clark, Bill Sullivan ("Sully"), Tex Harrell, and author Knowlton. All except Clark and Knowlton are now deceased.

They screamed bloody murder, wanting to know why I didn't move forward that night. I took a little of that and then got mad, told them that we were soldiers, and if our general told us to stay there that night we would stay.

All our vehicles came back into town and parked in the main square. I arranged for two platoons to stay with me in the CP, living upstairs in a hall. The Germans complained that it was an SS billet, but I ran the SS out and moved in.

So far, the day had been the biggest piece of deceit in history. The bluff was working only because they thought I was the whole American Army, and because they thought that when I met the Russians there would be a line of demarcation. I knew that if I got into trouble no one could come and help me. I knew that this territory would be Russian after the war.

I was hardly settled when the phone rang. It was the German major in charge of Parchim. "Herr Kommandant," he asked, "when are the other Americans coming?"

"Oh," I answered, sweating like a pig, "they will be there very shortly. Many tanks and infantry. If they don't get there tonight, they will in the morning."

The major sounded a little worried. "Have you any instructions for me?" he asked.

I saw my chance to double the magnitude of his job. "Yes," I said. "You will collect the arms from all troops and turn them all over to the Americans when they arrive."

He screamed like a wounded eagle.

"I don't give a damn what you think," I yelled. "I am military commandant and I order you to disarm everybody." A brilliant thought hit me. "And don't forget that corps headquarters out there with General Hernlein." And I hung up.

A captain from the Hermann Goering Division arrived. He stated that his general did not believe there were American troops in Lubz, and wanted a cigarette as proof. I'd be dammed if I was going to give him an American cigarette, so I wrote a note as follows:

"This is to certify that American troops have this date captured Lubz, Germany. William A. Knowlton, lst Lt., Cavalry, Commandant.'

With this note I enclosed a piece of chewing gum.

A captain from the Panzer Marine Brigade came up. He was big and nasty. He spoke English very well and started giving me a hard time. He was defending a line farther east, and insisted that I go out and meet the Russians immediately.

I told him I'd go out when I was ready, and that I was not sending any of my people out in the night for him or anyone else. He tried to browbeat me into telling him my orders, and how many troops I had, and every few minutes that telephone would ring and a voice would say, "Herr Kommandant, the American troops are not yet here in Parchim."

"They will be there," I would say, the sweat oozing from my brow.

Here is the setting and a cross section of conversation in that CP:

"My spirits fell. "Knowlton," I thought, "you were a damn fool to think you could ever get away with it. Right above you sleep 60 men who trust you, and you have led them into a deathtrap."

As the lights go up we find a battered beer joint, filled with young, strong German soldiers. Upstage is a huge desk, a picture of Adolf Hitler behind it, at which our worried leading character is sitting. The only light is almost a spotlight shining directly on the desk, making it seem like a third-degree setup. His dirty combat jacket is ripped and tattered by shrapnel, his face is filthy, and a two-day stubble grows on it. As the curtain opens, the Panzer Marine Brigade captain is speaking. He pounds his fist on the table.

Panzer CPT: You must go out and meet the Russians tonight. They are advancing here in this room (from the German word *raum*, meaning space) and you must meet them. They are here or here (pounding map for emphasis). You must go out tonight.

Knowlton: Don't tell me what to do. My orders are to stay here and meet them here.

PZ CPT: You are not in communication with your headquarters.

Knowlton: Certainly I am, but my orders are to stay here.

Engineer: Herr Kommandant, the general just had me lay a mine field outside the town here. May I go to my company now with my detail?

Knowlton: No, get out there and take up the field again. Here is a pass so the other American troops will not stop you. (Troops being nonexistent.)

Engineer: But the general ordered me to...

Knowlton: Get out and take up that field.

PZ CPT: The Russian will not advance tonight, because he will be sleeping with our beautiful German girls. Our lovely girls will be raped.

Knowlton: Propaganda!

German CPL: Herr Oberleutnant, these men wish to check the bulb above you for to the electric go make. (Telephone rings.)

Knowlton (To phone): They are coming now. (To captain), I will not go anywhere tonight. (To workmen) Get your dirty feet off my neck!

German CPL: Sir, I beg your pardon, but the burgermeister wishes to know if he can go home to bed.

PZ CPT: You will see when you are fighting on the banks of the Polish rivers - when the Russian has finished sleeping with our beautiful German girls. You must go out tonight.

GI (entering with struggling SS man): Sir, this lousy bastard tried to drill me...

SS man: *Dieses verdammte Amerikanische schwein*....(telephone rings.)

Telephone: Herr Kommandant, the American troops are not yet in Parchim and the Herr General has ordered all troops to take up arms and return to the front. What shall I do? When are the other Americans coming?

GI: Shuddup, you, or I'll knock your teeth out.

German Major: Herr Kommandant, the brewery is now full of arms. Where are the soldiers to turn in their arms now? (A few rounds of Russian artillery fall outside.)

PZ CPT: See there. Here come the Russians! You must go out and meet them here - in this room. You must get your men up.

Knowlton: Yes, he can go home now. Find another factory for the arms - I don't care where. Get your feet off my neck, you bastard. Get that burgermeister out of here - he makes me nervous. Which direction is that artillery coming from? No, I will not go out tonight with any patrol. Etc., etc., etc.

This went on for hours until I was worn out. Remember that I had not slept for two nights and days. The final blow came when this arrogant panzer captain leaned over the desk, rapped on the map, and said, "I think you are bluffing. First, I think you are no longer in communication with your headquarters; and second, I think there are no American troops nearer here than Ludwigslust, and that no more are coming.

Dead silence fell over the room - hard, hard eyes stared right through me. In that silence, the outside sounds suddenly became louder. I heard the clashing of tank tracks, the sputter of trucks, the songs of the SS carrying clear in the cold, bitter wind, the crack, crack of hobnailed boots, the loud commands of German officers.

My spirits fell. "Knowlton," I thought, "you were a damn fool to think you could ever get away with it. Right above you sleep 60 men who trust you, and you have led them into a deathtrap. This is your last bluff, and it had better work.

You used to claim you were an actor. This is your last chance, son."

So I squared my shoulders and stared at the crowd. "Don't be stupid. Do you think I'd be dumb enough to come way in here, take over three cities and disarm several hundred thousand German soldiers unless there was a large force following me?"

The captain stopped, scratched his head. "No," he answered, "I guess not."

"Now I'm going to bed. I'm dead tired."

There were loud protests. Everybody screamed that the Russians would attack during the night.

"I don't give a damn," I said. "I don't care who comes unless I get some sleep. Good night!"

The entire room clicked their heels and gave the Hitler salute. "*Gute nacht, Herr Kommandant!*"

The next morning I went downstairs, and things were critical. The German High Command had discovered that I was the only American force this side of Ludwigslust, that we had disarmed, by SS count, 275,000 German troops, and that the whole German Army was laying down its arms in Lubz. Orders were issued for them to take up their arms again, and shoot us if we resisted.

I had a half-hour argument with an SS colonel from the corps staff. We agreed that all troops going west would lay down their arms, while those going east could keep theirs. He made that agreement because he was too proud to admit that there were any German troops retreating from the east. So he went away - his honor satisfied - and my boys continued to do a land-office business at the arms-collecting points, of which we now had several.

Soon, however, fist fights broke out between my boys and the SS. Only the guts of certain of my boys kept things from getting out of control. But it could not last much longer. The only solution was to get out on patrol, so we could save our face and still avoid the ultimate shooting match.

I got my armored car ready and had Harry Clark's platoon follow me. Before I started, I got two officers from a German engineer outfit and put one over each front wheel on my car. "Now, gentlemen," I pointed out, "if my car hits a mine, you will be just as dead, or slightly more so, than anyone in the car." We started down the main road to Plau - my two officers sitting on the front like two bird dogs, just scanning hell out of the road for mines. Best mine detectors I ever saw.

The country is this area is rolling, and as we neared Plau we could see for great distances - so also could anyone on the other side see us. I could hear the sound of firing in the distance ahead, and began to worry about the problem of mutual recognition. We had been assured that the Russian tanks would all have white triangles and that they had been oriented on our markings. But at the distance from which someone could shoot at us, our markings were not too legible.

As we neared a small town, one of the German engineers suddenly shouted, "There is our German artillery!"

Traveling along the skyline from east to west was the longest column of horses, horse-drawn wagons, and marching men I have ever seen. I grabbed the field glasses, took a look, and handed the glasses to the German. "Look again, Herr Hauptmann," I told him, "and then tell me for how long the German army has had Cossacks in high fur caps riding the column!"

Well, we had gotten that far - now the question was how to make the historic junction without getting a lot of people killed. I called up a peep, climbed on the front of the radiator with a big white flag, and started down to the town. As we rounded a corner, there was a Russian major looking at a map. I leaped off the peep, clicked my heels and saluted, yelled, "*Ya Amerikaneetz Oberlitnant,*" and shook hands with him.

Thus, at 0925, 3 May 1945, was junction made between the American and Russian forces north of Berlin. It was the first contact on the other side of the Elbe.

I radioed Harry to bring the rest of the vehicles down, and then the major guided us through his troops to the colonel. The Russian Army is unique. I expected a military machine, manned by stern-visaged men, with a lot of mechanical equipment. What we found was a conglomoration of horses, German trucks, bicycles, Cossacks, tommy guns, motorcyles. There seemed to be no system, and people just wandered in and out of the column at will, with apparently no orders or particular jobs. Every other man was an officer. Everybody grinned, saluted us, and yelled some unintelligible gibberish - while we grinned, saluted and grinned.

Finally we caught up with the colonel. I expected a big Russian

with medals hanging on his chest and a tommy gun in one hand. What I found was a farmer-like individual, serenely driving a two-horse wagon as though it were Sunday in Central Park. Sitting beside him was a girl in uniform. I later learned that she was a Russian nurse named Maria.

When the colonel learned who I was and from where I had come, he got out and pranced around, all grins. We shook hands and slapped each other on the back. I soon found out that the way to make an impression on a Russian is to run up, hit him a clout on the back that would fell an ordinary man, grasp his hand in as tight a grip as possible, embrace him, grin like a hyena, and yell loudly, "*Tovarish!*" or "*Ya Amerikaneetz!*"

Maria came flying out and we smootched her and slapped her back. She was built like a small ox, very close to the ground, and with a 44 bust. While everybody was hitting everybody else on the back and jabbering, the colonel got out his Russian map, which looked like Chinese to me, and I got out my map, and between us we figured out which route I had come. He expressed great wonder that I had been able to pierce the German lines and somehow get behind his task force so that we came up on them from the rear. It's a good thing we did. The Russians had no white triangles on their vehicles, and they all stared at ours saying, "Oh look, comrade - the *Americaneetz* have a star on their cars!"

The colonel got out a red pencil and we signed each other's maps, marking the place where we met. Then I got out a bottle of Three-Star Hennessey I had brought for a gift and handed it to him. He in turn handed it over to Maria and we all grinned at each other.

I had no one with me who could speak Russian, but I had a kid who could speak Polish. So the colonel sent for a Polish-speaking officer - a very young major - who finally came wandering up. The conversation had been a little bit sorry until then, but once this Pole appeared, things livened up a little. We batted the breeze a while longer, through him, while millions of Russians climbed all over my armored cars, trying the guns, talking to each other on the radios, opening and closing the hatches, and generally acting like the eighth grade on a visit to the military exposition.

Three soldiers of the Soviet 191st Infantry Division greet Knowlton's troopers at Plau, Germany, 1945.

Every now and then one would let go a burst with a tommy gun, or with one of my machine guns, which would narrowly miss killing the whole staff - at which everybody would laugh uproariously and hit each other another clout on the back. Then the colonel sent word to the division commander what had happened. The division commander sent back word that he would be right up for lunch, and to pick out a good CP. So the colonel selected a good CP and Harry and I, with about ten Russian majors and captains, and Maria, repaired to the CP for lunch.

I wish Military Government could have seen the Russians take over a new CP. The colonel looked around at the neighboring houses, picked out the nicest, and said, "I'll take that." Immediately, several Cossacks galloped up to the house, hurtled off their horses, and strode into the house. There were several crashing sounds; I heard some glass break, a few splintering noises of wood, probably doors, one loud crash, a scream - and then the door opened and two aged Germans came flying out, evidentally propelled by a large Russian boot. They had no sooner hit than a Cossack appeared at the door carrying a German boy by the seat and neck. He cleared the hedge with that one. There were more noises of doors smashing and glass breaking. In this manner was the new CP taken over.

When we arrived in the living room, all the preserved fruit from the house was on the table. Pretty soon, two good-looking Russian girls came in, carrying a platter of fried eggs and other edibles. I thought they were camp followers of some sort, but found out that one was a corporal in the infantry and the other a captain in the cavalry. The colonel strode in and seemed

"The officers looked at each other with that "the-old-man-is-drunk-again" look, folded up their books and yelled the Russian for 'Hey gang, the bastards are over that way. Let's go! '"

satisfied with what he found. He took my bottle of Three-Star Hennessy, plus a bottle which Clark had donated, and poured us all a water-glass full. I was looking at the thing speculatively when suddenly all the staff rose to their feet, and the colonel said in booming tones, raising his glass high, "Trrroooooman, Staaleen, Churchill." Whereupon everyone clinked glasses with everyone else.

Then they drank. I say "they" drank advisedly, because every Russian there gulped a water-glass-full of cognac in one swallow. Clark and I took a good, healthy swig, and my throat burned for several minutes. The Russians all roared with laughter and belted each other, and gave us to understand that Americans were a namby-pamby race because we could not take a little slug of cognac.

Ghosts of the Wild West heroes smirked at us, and I could see that the prestige of the American frontier days depended on us. So Harry and I rose to our feet and took the whole glass at one gulp, and then collapsed, our eyes watering, trying to look as though that was what he had been going to do all the time, so there.

The next thing we knew there was a water glass full of vodka at each place, and all the Russians were standing. We rose swiftly, if a little unsteadily, and the colonel proposed: "*Ameerika, Roooosia, Ingelant*" and we went into the bell-ringer act again. This business continued every time a new officer came into the room, until I was high as a kite.

At one point we gave the colonel a pack of cigarettes and thereby learned something about why so many millions of Germans were fleeing the Russians. He fumbled in his pocket, but could not find any Russian cigarettes to give us in return. Obviously international good will was hanging in the balance; so he summoned a Russian corporal and whispered in his ear. The corporal gathered a detail of several men and left. Two minutes later I heard a commotion outside, and then in walked the corporal with eight packs of German cigarettes and gave them to the colonel, who in turn presented them to us with a great flourish. "German," he said, "but good."

Pretty soon the division commander came in. He was a man of a great deal of intelligence, and we had quite a conversation. I explained to him that I had been sent by my general to bring a member of his staff back to American headquarters. He said that he would go with me.

I then explained that there were many Germans still with arms between us and the American lines. He became quite annoyed that I had not disarmed every German between the Elbe and the Baltic. I explained that I had only 100 men. He accepted my explanation, making a few comments on how much harder the Russians had to fight for their prisoners. I told him that we too had had a few battles since Normandy.

This division commander finally told me to tell my general to meet him in the church at Lubz. I was to go back to Ludwigslust with this message, taking with me the Polish-speaking major, who was still busily proposing toasts.

During our lunch ceremony the war had been stopped. Now it started all over again. I used to wonder how the Russians could hold all that liquor. I found out the answer; they don't. I watched the task force commander issue his attack order. He reeled out of the house to the field where his officers were assembled, all alert and with notebooks poised. He stood there for a minute, held up the map - back to the officers so that no one could see it - and then started mumbling something about "we go from here to thish plashe and then we go to thish plashe," all the time pointing to the map which no one could see. I can't understand much Russian, but I got as much out of that order as anyone there.

He went on with this mumbo jumbo for a while, until the officers looked at each other with that "the-old-man-is-drunk-again" look, folded up their books and yelled the Russian for "Hey gang, the bastards are over that way. Let's go!"

So several thousand happy-go-lucky Russians shot into the air and at each other, and the weird column started weaving down the road.

On the way back to Lubz, I happened to glance around, and almost fell out of the turret. Sticking out of the assistant gunner's seat on Clark's armored car, looking like a jack-in-the-box was our drunken Russian major. He had a towel over one arm, a huge razor in his hand,

and was laughing uproariously while trying to shave the gunner.

We finally got back to Lubz, and maybe.I didn't sweat going through the German lines again. I kept thinking of that panzer marine captain and his antitank gun. But Russian tank columns had already taken Neustadt. There, a Russian captain sidetracked me and made me drink and share a chicken with him, while he alternately hit and kicked an SS major he had in his car with him.

Later I got back to Ludwigslust and reported that my mission had been completed.

As an additional note, the next afternoon, I was called to General Gavin's CP, and in a ceremony there the Silver Star was pinned on me by the General. I feel especially proud of that, because it came from another division than my own. I wear the medal, but B Troop won it, and I wear it for them.

Author's Postscript

This piece, written almost 45 years ago, was never intended for publication; it was an attempt to tell my family what had happened to me in early May. Therefore, it is very self-centered. Had I known it was to be published nationally, I would have given more credit to the late Bill Sullivan, that foolhardy and superb soldier who persuaded me to go full speed into unknown land. All my officers are now dead except Jackson Clark (then called Harry) who lives in New Mexico. Also in Fiddler's Green are Hoyle Ladd, platoon sergeant turned first sergeant and called by Bruce Clarke in the Bulge the ideal citizen-soldier, and Platoon Sergeant Harold Gill of the 3d Platoon, whose toughness won him a Silver Star on this mission.

Armored Divisons of that era, fiercely proud of their identity, wore their taller overseas caps on the left and called jeeps "peeps." Each recon platoon had three M-8 armored cars and six peeps - three with machine guns, and three with 60-mm mortars, although all six peeps had policed up machine guns by this time, and armored cars had acquired extra external machine guns on the turret for antiaircraft. While there were more peeps and armored cars in the headquarters platoon, there were half-tracks for command post and supply. It is these which were left behind on the mission, along with the attached assault gun platoon, in view of the uncertainty of POL resupply.

Cut by the Reader's Digest was the first part of the report, which dealt with the late warning order, the move to join the 82d Airborne Division, and our place near the rear of the column, then being asked to break out of the bridgehead across the Elbe (through troops already in contact), veer east and push my platoons on three parallel routes to Ludwigslust ahead of the 82d. This segment starts with Ludwigslust taken and during the policing up of prisoners. We had been told no Allied forces were to go east of Ludwigslust, by Three Power Agreement. But reports of nearby Soviet forces persuaded General Gavin to try and make contact - contact which might prove dicey to do without incident.

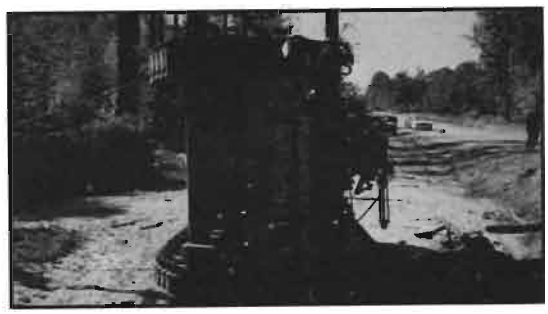
My troop was the instrument of this try.

CPT Knowlton in mid-1945

General William A. Knowlton, USA Retired, was commissioned in Cavalry from West Point in 1943. He served in WWII in the reconnaissance squadron of the 7th Armored Division, after an initial assignment in the 40th Armored Regiment. He later commanded the 1st Battalion, 3d Armored Cavalry Regiment, and the 1st Armor Training Brigade, and was tactical commander of the 9th Division's multi-brigade operations in IV Corps of Vietnam. He served as superintendent of West Point and as CG of Allied Land Forces Southeast Europe, in Turkey. Retired in 1980, he is Honorary Colonel of the 40th Armor Regiment and holds the Gold Medallion, Order of St. George.

Mission Accomplished; All Crews Safe

by Lieutenant Colonel Paul D. Terry



The vehicle commander was killed in 1987 when this M113 hit an unmarked culvert while moving in heavy dust.

Eleven soldiers lost their lives in tank accidents in fiscal years 1986-1988. The total impact of the loss of these lives is immeasurable. The loss is felt in both the unit and the family. The unit experiences disruption in operations, lowering of morale, and a reduction in confidence and esprit. The families of the soldiers are scarred for life.

Tank accidents during the same period cost the Army $6.3 million. Accidents involving M1s were the most expensive, costing $3.6 million. The money used to pay for accidents would have been enough to purchase 30,582 rounds of 105-mm ammunition.

"Our record for preventing tracked vehicle accidents is not a good one. This poor record, in turn, may reflect operational weaknesses in our planning for training and, by extension, our ability to plan for deployment and combat," according to MG Thomas H. Tait, Chief of Cavalry and Armor (See *ARMOR*, November-December1988).

No officer or noncommissioned officer wants to see soldiers killed or maimed, or the excellent equipment fielded in the last decade lost to accidents. Military leaders are professionals who focus on the mission, but at the same time protect all soldiers and resources. They work hard every day to provide a safe work environment for their soldiers. These leaders would like to make the Army even safer. However, in most units the training schedule is full - the last thing leaders need is another special emphasis program. Fortunately, no new program is needed.

The ingredients necessary to make a safer Army are in place. Safety awareness among leaders is excellent. Leaders and supervisors of all ranks accept their responsibilities as safety officers for their vehicles, squads, and platoons. But safety awareness and the desire to save lives and dollars will not guarantee a safer Army anymore than a desire to be number one will guarantee a winning football team. Success will come from a carefully thought-out training plan executed with tough discipline and adherence to published standards.

"As commanders, we must ensure that we plan safety into all of our training," said MG Tait, in his column in *ARMOR*.

Safety must be totally integrated into everything the Army does, at all levels of the chain of command. The key is integration, not lip service. Leaders must prepare the operations so that units can reach their objectives safely. A poorly

RISK ASSESSMENT WORKSHEET OPERATION _____

Side A **Planning**

CIRCLE ONE — Risk Value — SCORE _____

Guidance	Preparatory Time: Optimum	Adequate	Minimal
FRAGO / OPORD / OPLAN/LOI	3 / 2 / 1	4 / 3 / 2	5 / 4 / 3

Mission Control

CIRCLE ONE — Risk Value — SCORE _____

Task Organization	Training Event: Support Nontactical / Garrison	Day Tactical	Night Tactical
OPCON / Attached / Organic	3 / 2 / 1	4 / 3 / 2	5 / 4 / 3

Soldier Endurance

CIRCLE ONE — Risk Value — SCORE _____

Environmental Preparation	Soldier Preparation: Optimum	Adequate	Minimal
Nonacclimated / Partially Acclimated / Acclimated	3 / 2 / 1	4 / 3 / 2	5 / 4 / 3

Soldier Selection

CIRCLE ONE — Risk Value — SCORE _____

Task	Soldier Experience: Highly Qualified	MOS Qualified	Untrained
Complex / Routine / Simple	3 / 2 / 1	4 / 3 / 2	5 / 4 / 3

Side A Subtotal _____

Side B **Weather**

CIRCLE ONE — Risk Value — SCORE _____

Temperature °F	Visibility / Moisture: Clear/ Dry	Fog/ Humid/ Drizzle	Rain/ Snow/Ice/Dust
<31° or >80°	3	4	5
32°-59°	2	3	5
60°-79°	1	2	5

Terrain

CIRCLE ONE — Risk Value — SCORE _____

Type Terrain	Trafficability: Improved	Secondary	Trail/Cross Country
Mountain / Desert/Jungle / Hills / Flat/Rolling	3 / 2 / 1	4 / 3 / 2	5 / 4 / 3

Sustainability

CIRCLE ONE — Risk Value — SCORE _____

Percentage Personnel Fill	Type System: Wheel	Track	Crew Served
0-65% / 66-79% / 80-100%	4 / 2 / 1	5 / 4 / 2	5 / 4 / 2

Subtotal Side B _____ Subtotal Side A _____ Total _____

0 to 12 Low Risk	13 to 23 Caution	

Figure 1. Using a risk assessment sheet like this one can help leaders think objectively about training safety.

designed operation may mismatch soldier skills, equipment, and conditions. When this happens, soldiers will be placed in situations in which success is unlikely, but accidents are likely. Conversely, operations that are thought out in detail, with a risk assessment (see Figure 1), conducted prior to development of the concept of the operation, can contribute significantly to mission accomplishment. The following hypothetical tactical situation demonstrates two approaches to mission planning.

A tank company is to conduct a night tactical road march. Two platoon leaders receive the company operations order and prepare their platoons to execute the mission.

The first platoon leader reviews the company OPORD, notes his assigned route and march table, briefs his platoon, and, as he concludes the briefing, reminds his tank commanders to be safe. The platoon leader wants to be safe, but has no strategy to analyze the mission and design safety into his operation.

The second platoon leader also receives the mission from the company commander. He discusses the following items with his platoon sergeant:

- Time available for preparation and rehearsals.
- The fact that the road march will be executed at night.
- The amount of night-driving experience of each driver, and how long each of the crews has been together.
- Weather and light data (moonrise and set, percentage illumination, and cloud cover).
- Type of terrain (reconnaissance is requested).
- Maintenance posture, including night vision devices.
- Fatigue.

Based upon his risk assessment, the second platoon leader recommends the following to his company commander:

- Earlier movement time to complete the move prior to moonset.
- Slower speed to compensate for low percentage illumination and driver inexperience with night vision devices. (Due to equipment shortages, the tank commanders do not have night vision goggles.)
- Night-driving training for selected crews prior to move-out.

The platoon leader and platoon sergeant accomplish the following within the platoon:

- Sand table rehearsal of the road march, emphasizing emergency procedures, such as what to do if there is a break in the column.
- Physical check by the platoon sergeant of night vision device installation and operation.
- Night-driving training for a new crew prior to move-out. The platoon leader's wingman will conduct the training.

The goal of each platoon leader is to be both successful and safe. One platoon leader tells his soldiers to be safe. The other analyzes the mission, assesses the risks, develops countermeasures, establishes checks, and builds safety into the execution paragraph of his operation order.

Our goal is for soldiers and leaders to have a sixth sense of safety. But simply stating the goal will not develop the sense of safety. A disciplined, detailed approach to mission analysis and operation preparation fully involving subordinates in risk assessment and countermeasure development will ensure safer units now. And future officers and NCOs will be as familiar with risk assessment and countermeasure development as they are with using the factors of METT-T. Disciplined execution must follow disciplined planning.

"Leaders must instill in their people a strong sense of individual responsibility for safety in training, in working, and in living," said General Carl E. Vuono, Chief of Staff of the Army, in a recent article.

Leaders in the company headquarters and higher establish the environment in which junior officers and NCOs operate. The environment will either encourage safety or discourage safety; rarely will it be neutral. Demonstrated policies and reactions of senior commanders toward goals missed and achieved establish this environment. For example, a battalion commander who warns of harsh treatment for subordinates who fail to achieve movement table times, no matter what, may indirectly encourage speeding. Improper interval, size, weight, and speed top the list of task errors leading to armor vehicle accidents.

Based on risk assessment work conducted by his staff, the battalion commander can avoid demanding compliance with an unreasonable schedule. Junior leaders, in turn, must provide feedback for the battalion commander. Don't blow the road march and then tell the battalion commander the timetable was unreasonable. Senior commanders must check to ensure that subordinate commanders conduct realistic risk assessments, ask for feedback, and then develop and implement countermeasures. Within this environment, units will be both safer and more effective.

Disciplined units maintain standards. They stay in uniform, salute, clean weapons, and maintain local security. Standards are enforced by the NCOs. Violators of established

The Price of Failure...

An engine fire in this M1 ultimately destroyed the tank, at a cost of $1.6 million. The accident happened in 1988 at the National Training Center.

standards are corrected before an improper procedure can become the new standard. In armor, there should be no discipline problems because every tank, scout track, mortar carrier, and most other vehicles are commanded by an officer or NCO. Armor units that fail to follow their SOPs and operator's manuals have a leadership problem.

Some units require the first NCO in the chain of command to give Friday afternoon safety briefings. The intent is to reduce accidents, especially accidents involving the soldiers' private vehicles. These briefings remind soldiers of safety considerations, remind them that their sergeant is concerned about safety, and remind the sergeant that he or she is a safety officer. The NCO who works with a soldier daily is best able to determine if the soldier is having problems and may be unsafe. For example, a soldier might be too fatigued to start a long POV trip. The squad leader counsels the soldier to get some sleep and depart early the following morning. Senior leaders can brief soldiers on command policy and provide general safety tips, but the squad leader evaluates individual soldiers, determines specific risks, and takes specific actions to counter the risks. This is called tough caring.

Safety really is first-line-supervisor business, and leadership by example is essential. Soldiers tend to emulate their NCOs. If NCOs strictly adhere to SOPs, regulations, and technical manuals, so will their soldiers. Similarly, soldiers will know if their NCOs violate the rules, such as firing an M1 tank with the ammunition doors locked open, or firing an M1A1 with the stub-catcher missing. Every time an NCO allows a safety violation to go uncorrected, the NCO sets a new safety standard. Every time an NCO violates accepted standards and procedures, both the NCO Corps and safety suffer.

We have good equipment, good soldiers, good NCOs, and good officers. Leaders are interested in safety. Risk management (risk assessment and countermeasures) works. As NCOs and junior officers become increasingly skilled and disciplined at employing risk assessment and countermeasure development, and as we become more disciplined about enforcing compliance with operator's manuals and SOPs, we will better protect our soldiers and preserve our equipment.

Lieutenant Colonel Paul D. Terry, Jr., was commissioned at West Point in 1970 and served as a tank platoon leader, scout platoon leader, and battalion S3 in the 3d Armored Division. He commanded Company B, 1-37 Armor, 1st Armored Division; and was XO and commander of 3-37 Armor, 1st ID. A graduate of the Armor Officer Basic and Advanced Courses, he is the Armor Team Chief at the U.S. Army Safety Center, Fort Rucker, Al. He was recently selected for a senior service college.

A Missing Link in Support of Light and Heavy Forces

by Lieutenant Colonel Burton S. Boudinot (U.S.A.,Ret.)

As we approach the 21st century, we need a better approach to destroying massed armor formations - top attack by new ammunitions or smart munitions, and new mines. As I have said in previous articles, tank-versus-tank is not the way to solve the problem. That approach should become history. Today, the procurement of one armored vehicle can cost well over a million dollars. That's billions in offensive firepower on the battlefield. In turn, there are also billions of dollars in defensive antitank weaponry out there. Is this a draw?

The tank is primarily a direct-fire weapon. It shoots straight at its target. It must see it. Now, if we can attack tanks and supporting vehicles indirectly with smart munitions - and we can - we gain a couple of advantages. One, we gain a psychological edge if the enemy cannot see where the fire is coming from. Second, such an approach is cost-effective.

We have made the tank a highly mobile bunker, but the bunker buster is here. The era of the smart munition is just dawning. The future is obvious; we must think clearly on how we want to engage the other guy's armor threat. With what we know today, certainly, tank-against-tank in a direct-fire mode should not be the primary mode of defeating tanks.

Therefore, the author has asked, "Does the U.S. Army have a validated requirement for a light armored, antiarmor, airmobile, indirect fire-support vehicle (LA^3IDFV) to support light and heavy forces?"

The answer is "No". There was a validated requirement for a light armored gun system, a kinetic energy, direct-fire approach... a light tank, so to speak.

I've asked, "Is the Army ever going to get an armored gun system (AGS)?"

The answer, I'm told, is probably not, because of budget and policy constraints. But mainly, there seems to be no agreement on the role of such a vehicle. The DA staff, Infantry and Armor branches, and the Marine Corps, do not appear to have a common mission profile for such a system.

I ask, "Is the Army working on a LA^3IDFV concept to support heavy and light forces?"

From what I can determine, not in any depth. The problem again, and always, is, "What is the mission profile; what do you want the system to do? Can we make do with what we have?"

I ask, "Does the Armor Force have an armored, antiarmor, indirect fire-support system for the many contingencies where airborne, airmobile, or light infantry might be committed? Does the infantry?

I find the answer is no for armor, except for the 73rd Armor in the 82nd Airborne Division, which is history. Armor is prepared for large land mass, combined arms warfare in Europe and the Middle East. The answer is also no for infantry. Both the light and mech infantry need highly mobile organic indirect fire support to engage armor and infantry targets in a strategic role. It must be armor-protected.

Let me ask this: "If there is no large land mass warfare, where might U.S. ground forces have to be deployed in the next couple decades?

Standard answer: Many places where the United States has a national interest. The United States has a worldwide commitment to enforce or support treaties or strategic interests.

Let's ask this question: "Can M1 tank units and M2/3 infantry or cavalry units be deployed worldwide on short notice?"

According to general officer briefings, the answer is, not realistically. Many contingencies, especially from a strategic mobility response standpoint, require airmobile or light forces to have a highly mobile organic armored antiarmor capability, to include a medium-range HE capability.

If we were to consider then that an armored gun system is not the way to go, what is an LA^3IDFV concept? What is it expected to engage, and what would it weigh?

My specifications for such a vehicle would require it to engage

infantry formations, helicopters, and a variety of armored vehicles, to include tanks. It could weigh as much as 20 tons, and it would be expected to survive some degree of hostile artillery fire.

You might ask, "Engage tanks? Is that not Little League against varsity?

Yes, I would agree, if the vehicle were limited to the direct-fire role. *But what if the system were equipped with indirect-fire weapons and primarily employed in a "hide and fight" posture?*

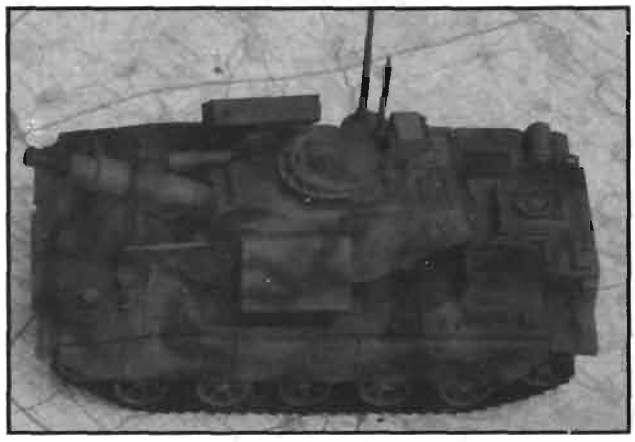
You ask, "What is a hide-and-fight posture?"

I would describe it as a system that a combat commander can use to engage in a direct-fire mode, but prefers to use in an indirect-fire mode. Its mission would be to support engaged units, reducing threat forces by effective indirect fires that use advanced acquisition technology to cover areas short of available friendly artillery. The idea is to hide to support.

You might ask, hey Boudinot, are there chassis and weapons components for such a weapon system available today in the United States?

The answer is, of course, yes. And the system and vehicle can be carried in a C-130, a very important criteria. The system would be expected to support both heavy or light forces in a variety of missions, but optimized for airmobile requirements.

So what kind of system are we talking about?



Author-built model includes many of the features he'd like to see in an indirect-fire antitank system, armed with a 120-mm mortar and guided projectiles to engage enemy vehicles from behind cover.

After years in the R&D field, I foresee a system of about 20 tons, mounting the new 120-mm mortar system and a missile system, with the primary role of engaging infantry and armor targets in an indirect-fire mode - "hide-and-fight." The idea is to survive to support. There are several new systems that would be effective. The chassis and weapons systems are in development. There is no void in technology in this case, just integration, which, while a problem, is not insurmountable.

You ask, "Is this an armor or infantry proponency system?"

The answer is that at this point, this is not important. Such a system is a missing link to a real problem, an armored, antiarmor, and HE fire-support vehicle for heavy, airmobile, and light forces, even cavalry, in a strategic mobility role. It is a non-developmental initiative (NDI) approach. It is not a new idea, but it makes sense. *Tanks must be destroyed at a cheaper cost than tanks-versus-tank in any intensity of conflict.*

I call the concept a light armored, antiarmor, airmobile, indirect-fire, support vehicle (LA^{3}IDFV). You call it what you may; nonsense, or a just requirement. If it is not considered a just requirement, the United States has a continuing problem in close-in antiarmor and fire support mission requirements, especially for a strategic response requiring light and heavy forces in the 21st Century.

We must think clearly about this matter.

Lieutenant Colonel Burton S. Boudinot retired in 1977 after 26 years in Armor. Commissioned in 1953, he served in cavalry units in CONUS, Korea, Germany, and Vietnam. He graduated from the University of Nebraska and completed military schooling up through the Command and General Staff College. After commanding a squadron in 1969, he entered the R & D field and served on several task forces before becoming Chief of Armor Test at the Armor and Engineer Board. After serving four years as the Editor-In-Chief of ARMOR Magazine, he retired and went into business as a consultant.

The Navy's Antitank System

A rapid-firing Navy deck gun, mounted in a tank, engages ground and air targets with a variety of rounds

By John Larry Baer

A Navy antitank system is not a contradiction in terms. The U.S. Navy used a 76-mm gun system from a shipboard turret against Iranian attack boats and oil platforms that reportedly were used to track American ships in the Persian Gulf. The shipboard turret and its 76/62 APFSDS ammunition could very easily be moved "lock, stock and barrel," (and automatic feeding and loading system) into an MBT chassis.

The in-house battle between missileers and cannoneers would not be solved by such an action. However, it would represent a bit of technology transfer (incoming, for a change) as advocated in Dr. Kurt Bastress's article, "Military and Domestic Technology Transfer," (*Army RD&A*, January/February, 1988). This Italian-developed system provides the accuracy, lethality, and sustainability of fire discussed in the article by Douglas Longshore and Jeffrey L. Grady that appeared in the same issue, titled, "Evaluating the Effectiveness of Antiarmor Weapons".

Unlike small calibers (30-, 35- or 40-mm.), this system would provide the Army with stand-off capability against armored vehicles on the ground, or aircraft and helicopters coming in for a strike. It also provides the room for proximity or variable-time fuzes and a considerably greater HE payload than can be squeezed into smaller projectiles. Also, course-correction technology can be adapted to a round of this size. In short, this U.S. Navy-proven 76-mm gun system could provide the Army with the reliability that even the best of missiles seems to lack.

In terms of logistic support and efforts to reduce the number of combat systems in the three services, the Army's use of rounds already found in Navy inventory would provide tangible savings. In terms of interoperability, we would be able to use the same round as our Allies in Europe without worrying about their availability in POMCUS.

The 76-mm guns and the turrets could be made at U.S. Army ar-

senals and tank plants, and the ammo and fuzes at our AAPs, GOCOs, and COCOs for our troops throughout the world. But in Europe, we would have a built-in, reliable production capability in Italy, just south of the Alps – close enough to the Fulda Gap by barge, rail, or air transport to be in our troops' hands within hours.

The OTOmatic (OTO Main Automatic Tank for Interception and Combat) is a mobile armored weapon system designed for:

- Defense of troops in the main battle area against air attack
- Defense of targets in rear areas against aircraft and air-launched missiles
- Engagement of light armored vehicles.

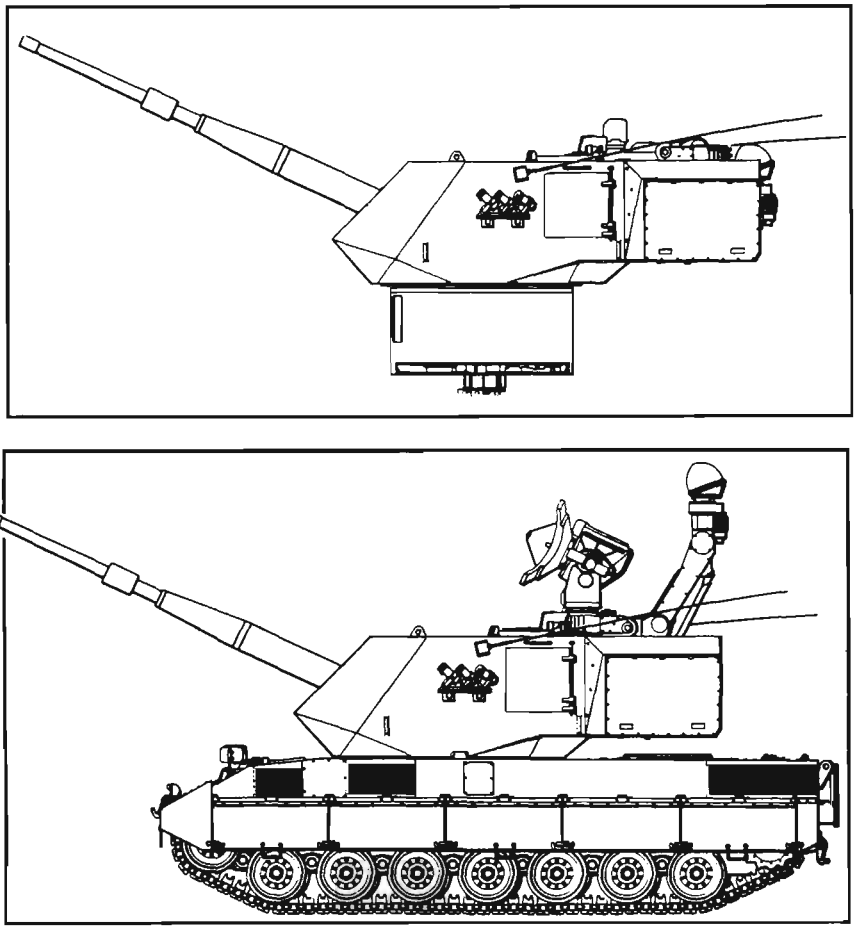
The capability of firing 120 rounds per minute enables the 76-mm system to cope with a high-density attack scenario. Its 16-km range permits engagement at sufficient distance to counter the terminal effectiveness and high payload of current air-launched weapons. Tests (such as described by Longshore and Grady) show that the OTOmatic can achieve equivalent Cumulative Kill Probability at three times the range of any other currently available point defense weapon system.

Another feature is the search and track radars of the integrated fire control system, designed to minimize anti-radiation missile lock-on projectiles. The search radar, with IFF for detection of flying targets, is augmented by a tracking radar with an auxiliary TV camera and an opto-electrical system (OES). The OES includes a low-light-level TV camera, laser rangefinder, and panoramic sight. It is designed to operate, day and night, under all weather conditions, with a fully computer-aided command and control system and manual override.

The 76/62 system currently has in inventory three types of ammo that, by virtue of its size, can be augmented by other sources. The 6.3-kg (13.86-lb) PF (pre-fragmented) projectile carries an 0.73-kg (1.6-lb) HE charge and is proximity-fuzed. The 6.53-kg (14-lb) MO (multi-option) projectile can be fuzed for VT, PD, or time-delay, and carries a similar charge. A 2.175-kg (4.785-lb) APFSDS projectile is currently under development.

The Army is always on the lookout for a reliable and effective ammunition transfer and loading mechanism. The OTOmatic feeding, transfer, and loading system is hydraulically driven. The technology is a direct outgrowth of the 80-round, ready-to-fire turret that the Navy has used successfully for more than ten years.

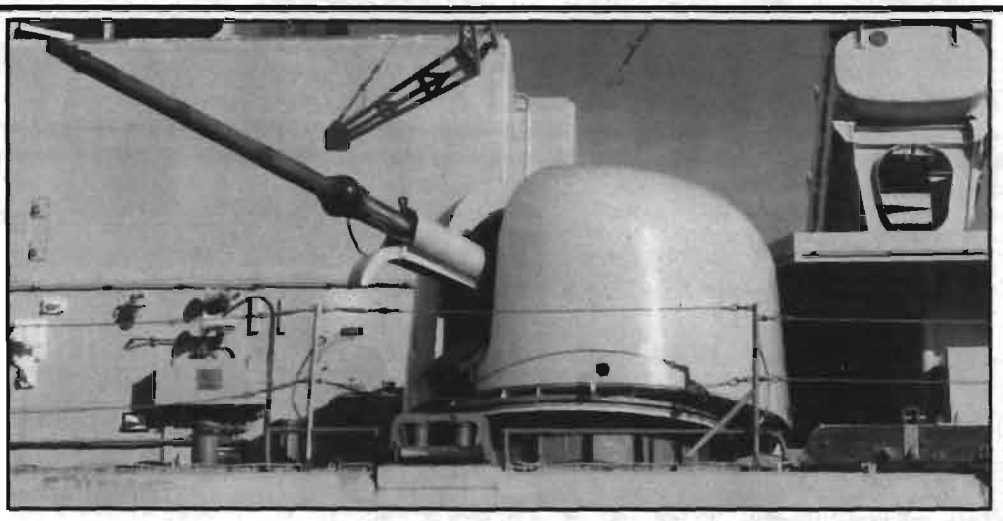
Adapting the 76-mm Navy Deck Gun To the Main Battle Tank Chassis



The Navy 76/62 deck gun, with autoloader, is available as a turret unit that can be installed, with its turret basket, in an MBT chassis.

The two transfer drums and rocker arms use hydraulic energy. The automatic feed system can be replenished manually.

The system has 360-degree engagement capability, with gun elevation limits from -5 to +60 degrees. For optimum ammunition allocation, 26 antiaircraft and three antitank rounds are ready to fire in the automatic feeding system, with 26 more accessible, stowed in the turret, backed up by a reserve of 26 rounds stored in the hull and nine rounds in the turret.



This Italian gun system, widely used as a deck gun by the U.S. and other navies throughout the world, has been adapted to various battle tanks in proof of concept tests by the manufacturer. It is seen here on the deck of the Italian destroyer *Ardito*.

It is not often that we have an NDI (Non-Development Item) that can directly meet our needs without time-consuming and expensive research and development or even military adaptation of a commercial item. Nor do we have the easy standardization, rationalization, and interoperability that the adaptation of this Navy system to Army use offers. The Army's use of this Italian technology, following time and battle-proven use by the U.S. Navy, could serve as an excellent example of the type of technology transfer advocated in Dr. Bastress's article.

In addition, it would be a very effective demonstration of the value-added concept, which is increasingly demanded in the DOD and Congress.

76-mm Super Rapid Gun System is shown on Italian OF-40 tank.

John Larry Baer is an international consultant in the field of engineering and factory automation. For 31 years prior to his retirement from the Army five years ago, he worked for the U.S. Army in the RDT&E and manufacturing technology of tanks, guns, and munitions. He holds a bachelor's degree in chemical engineering and master's degrees in industrial engineering and business administration. Baer is staff consultant to DGA International, which represents Oto Melara, developer of the OTOMAT, in the United States.

Remembering Some Hard-Fought Lessons of WWII, Part 2

Continued from Page 6

crew system is okay if you have the tank and need a whole crew.

The best organization I saw was the maintenance company of 67th Armored Regiment. The company was organized into a regimental maintenance section, three battalion maintenance sections (to accompany each battalion into combat), and a tank section, which consisted of three tank platoons of four tanks and crews each. A very fine organization, commanded by a major, with a captain second in command. A first lieutenant led each tank platoon, a warrant officer was assigned to each battalion maintenance section. This unit represents 90% of why the maintenance of the 66th Armored Regiment and 67th Armored Regiment was, without a doubt, the best in Africa, Sicily, England, France, Belgium, Holland, Germany, and Berlin.

- The tank section sent individual tanks and crews, or tank sections of two tanks and crews, or the whole platoon, as replacements.

- Individuals from destroyed tanks in the battalion were rehabilitated in the maintenance company tank section, which received replacements, refitted them for combat, and trained them. Few tank crew replacements received through the pipeline had been trained in their proper skills. In Africa, for example, tank gunners lost in combat were replaced with 105-mm towed artillerymen. Unit replacement is desirable, but will never happen. It lacks flexibility and application.

Knowing, understanding, and disseminating the commander's intent has recently become a subject of great discussion. Did you know and understand the boss's intent prior to operations? Your boss's boss's intent? Was it helpful?

Intent must be eliminated from the military dictionary. That's like asking Gorbachev and a member of the Politburo what their intent is. The military deals with capabilities. Politicians, foreign service officers, and political scientists deal with intent, and are always *wrong*. Intent is known only in the mind of the individual. Don't waste time trying to dig into his brain.

Force Design

Given the limited number of dismounted infantry in a Bradley platoon, should infantry companies be employed "pure", or in mixed tank-infantry teams?

The Bradley platoon is incapable of sustained combat. Its firepower is ineffective against the FST I and FST II. There is no way it can *defend* itself in combat in Europe, let alone support tanks in combat. To mix Bradleys with tanks for combat serves no useful purpose, unless you remove the men from the Bradley and make yourself believe they are infantry, and capable of supporting the tank, in the urban area of NATO.

Do you think combined arms battalions permanently task-organized with two tank and two infantry companies are viable organizations?

Tank units should be trained by tank-oriented NCOs and officers. Infantry units should be trained by infantry-oriented NCOs and officers.

The mix of three tank and one infantry, or two tank and two infantry, or three infantry and one tank should be formations for training combat tasks.

Keep the tanks together under a tank battalion organization during peacetime, and for administrative management in combat. Be trained for task force formations of combined arms.

The same goes for infantry battalions.

Should brigades be fixed, or is our current concept of task-organizing the way to go?

Brigade is a tactical HQ, which should be prepared to accept from one to six or more battalions of combined arms. They may change (in combat) hourly or daily (from any number of battalions). A lot will depend on the relationship between the division commander and the brigade commander. To have an outstanding brigade commander is a godsend.

Should the combat aviation brigade be considered a "maneuver" or "combat support" unit? Does it matter?

The Combat Aviation Brigade is a combat support unit, not unlike artillery, engineers, etc. Let's cut out the bull manure.

Each new tank is larger and heavier than the one it replaces. Should we be looking to smaller, lighter, and faster vehicles?

Smaller. Get the cost below $1 million, with advanced technology, i.e., stealth, (Stingray) laser, higher power microwave, HVM (kinetic).

Unless we move rapidly to take advantage of known technology, the tank will be off the battlefield by the year 2000, not unlike the horse in 1941.

Where is the best place for reconnaissance elements? The battalion? brigade? Both?

Armored recon units must be organic to the tank and armored infantry battalions, and the division.

Each battalion recon unit should have airborne recon, ground recon, and security capability. Each battalion should have the 1,000-foot-capability elevated sensor, capable of 30,000-meter observation (this is in the R&D stage) mounted in back of an M113. Let's get on with understanding that people don't see anything from the ground during combat. The Reconnaissance Surveillance Target Acquisition System (RSTA) is vital in future combat in Europe and other parts of the world.

Brigade is not the place for reconnaissance and security units in a division. The independent brigade need (the same source capability as division, on a lesser scale.

The Army of Excellence reduced our tooth-to-tail ratio, i.e., we lost more combat service support. Which CSS function did you find critical? Nice to have? A luxury?

Combat support or service support is absolutely essential in combat and during training for combat. A maintenance section, ammunition section, fuel sections, general supply (QM), ration section, radio relay section must accompany each battalion or battalion-size task force in combat. In the case of a battalion task force formation, the CSS must be able to sustain any special requirement of units attached for the engagement. These CSS elements should be organic to the battalion, or in habitual attachment from division elements.

Do we really need tanks in the cavalry? Divisional? Regimental?

Light tanks are necessary for cavalry to fight for recon (information) and security. Cavalry serves a real purpose in flank and rear area security, in addition to its recon and screening mission.

Cavalry or armored recon units do not need Winnebago M3 Bradley vehicles for scout vehicles. The people responsible for the cavalry units equipped with Bradley vehicles for scout section in the cavalry troop should be in *jail.*

Information for Armor Unit Captains and Lieutenants

Tanks require dismounted infantry for support in combat, night and day, in urban warfare, villages, towns, cities, forests, and terrain and weather of low visibility.

Armored infantry mounted in personnel carriers, or dismounted in combat, require tanks for support in open to closed terrain, against machine guns, dug-in positions, other enemy weapons, towns, and villages.

Armored artillery must be prepared to support, on a 24-hour-a-day basis, tank, infantry, and recon units in combat, from the march column, during exploitation, and in pursuit, not only in fair, but also in inclement weather.

The ratio of infantry to tanks in combat in NATO and other urban warfare areas will be one squad of eight-to-12 men per tank.

During WWII in Africa, Sicily, France, Belgium, Holland, and Germany, the best success on a daily basis was a tank company of 2/67 AR and an armored infantry company, 2/41 Armored Infantry Regiment. This meant 17 tanks, supported by 220-240 infantrymen, supported by one battalion of 105-mm artillery. The very minimum ratio of infantry per tank company is one platoon of four ten-man squads.

Be prepared to reorganize the battalions and divisions on short notice just prior to combat. Each division in combat (with today's firepower capabilities) must have at least 10 to 15 battalions of 155-mm, 8-inch, or MLRS in direct and reinforcing or general support.

Do not expect too much help from helicopters until the enemy air defenses are disposed of. Press for fielding of presently-known technology capabilities, stealth, etc.

General Hollingsworth has provided us with food for thought. Change for change's sake and sloganeering do not win battles. Hard, tough, well-trained soldiers, led by trained, thinking, tough commanders win wars. Our job is to ensure the legacy left by those great World War II battalion commanders - LTCs Hollingsworth, Abrams, et. al. - is not lost and continues into the future.

-THT

Armor Branch Reserve Personnel Center: Here to Help

The U.S. Army Reserve Personnel Center's Armor Branch provides personnel management support to Armor officers who are members of troop program units (TPU), the Individual Mobilization Augmentation (IMA) Program, and the Individual Ready Reserve (IRR). The primary responsibilities of the Armor Branch are the planning, coordination, assignment, and training of Armor officers not on active duty who live within CONUS, based on the current needs and requirements of the Army.

Personnel management officers (PMO) are assigned to each grade. These PMOs are responsible for assisting the individual officers in seeking the professional development education required for technical proficiency as well as promotion eligibility. PMOs provide the following management services:

- Monitor all Reserve Armor officers throughout their careers.
- Act as the primary points of contact for assistance and information.
- Coordinate Readiness Training tours and other training opportunities for qualified officers assigned to the IRR.
- Counsel and coordinate professional development schooling for all Reserve armor officers.
- Provide information on available assignment opportunities for TPUs based in (CONUS).
- Provide Reserve officers to other Army agencies for tours of temporary duty, such as annual training, site support, exercises, and schools.
- Provide information and assistance on how to get attached to units for points only.

All Armor officers assigned to the USAR should maintain contact with their PMO and call them at least twice a year, or whenever changes occur. This contact helps the PMO in updating records, keeps a current address and telephone number on file, and provides the opportunity for the PMO to keep the officer up to date on professional development requirements and opportunities to maintain skills. PMOs will do whatever they can to assist Reserve Armor officers, but in these austere times, do not be discouraged if the PMO cannot provide all of the training and schooling opportunities that were available in past years.

Stateside Unit Lieutenant Shortage Will Ease a Bit

The Total Army Personnel Command acknowledges that there is a shortage of lieutenants in FORSCOM and TRADOC units. This is apparently because new accessions have been going to fill overseas units...and there are fewer new lieutenants.

Armor has accessed approximately 525 lieutenants in the past two years, compared with 811 in Year Group 1984.

As a result, stateside units have only about 70 percent of the lieutenants authorized. TAPC sees some improvement on the way. An additional 80 lieutenants were to be accessed by winter's end, according to a recent announcement from the command.

Recognition Quiz Answers

1. BRDM-2 (USSR). Crew, 4; combat weight, 7,000 kg; max. road speed, 100 km/hr; max. water speed, 10 km/hr; max. road range, 150 km; amphibious; armament, 1 x 14.5-mm machine gun, 1 x 7.62-mm coaxial machine gun, 6 Sagger ATGWs, alternatively, 5 AT-5 Spandrel ATGWs.

2. M559 Tanker (US). Crew, 2; fuel capacity, 9,463 liters; loaded weight, 20,979 kg; empty weight, 12,859 kg; articulated 2-unit fuel truck w/4-wheel drive and is amphiblous. Can dispense fuel via pressure of gravity hoses.

3. ENGESA EE-9 (Brazil). Crew, 3; combat weight, 12,000 kg; max. road speed, 100 km/hr max.; cruising range, 1,000 km; fording, 1 m; armament, 1 x 37-mm main gun, 1 x 7.62-mm coaxial machine gun.

4. M813 6x6 Cargo Truck (US). 6-wheel drive; cab seating, 2; empty weight, 9,733 kg; road loaded weight, 18,985 kg; max. road load, 9,070 kg; max. cross-country load, 4,535 kg; max. road speed, 84 km/hr; max. road range, 563 km. GOTCHA! It's an inflatable decoy!

5. T-80 MBT (USSR). Crew, 3; combat weight, 42 metric tons (plus 3 tons with reactive armor); max. road speed, 85 km/hr; max. road range, 385 km (500 km w/auxillary tanks); armament, 1 x 125-mm main gun, unrifled, 1 x 7.62-mm coaxial machine gun, 1 x 12.7-mm AA machine gun.

6. BMP-2 IFV/ (USSR). Crew, 3 + 7 infantry; combat weight, 14.3 tons; max. road speed, 65 km/hr; max. water speed, 7 km/hr; max. road range, 600 km; armament, 1 x 30-mm main gun, 1 x 7.62-mm coaxial machine gun, 4 x AT-4 Spigot or 4 x AT-5 Spandrel ATGMs.

Master Gunner Course

The U.S. Total Army Personnel Command (TAPC) is seeking qualified noncommissioned officers in CMF 19 to attend the Master Gunner's Course, TDY enroute to their next assignment.

To request master gunner training TDY enroute, soldiers should submit a DA Form 4187 (PROC 3-10, DA PAM 600-8) to USTAPC, DAPC-EPK-I, 2461 Eisenhower Ave, Alexandria, Va., 22331-0452. All requests must be received not later than 45 days prior to the course start date. Applications will be approved only if the soldier meets the following prerequisites:

- Be Active Army in pay grade E5, E6, or E7. (E7s must have less than two years time in grade).
- Have a minimum of two years experience as a tank commander.
- Have passed the Tank Crew Qualification Course (TCQC) within the preceding 12 months, or the Bradley Gunnery Skill Test within the preceding gunnery.
- Be able to pass a Tank Crew Gunnery Skill Test (TCGST) upon arrival at the school.
- Be a volunteer and be recommended by his battalion commander (a letter of recommendation must accompany the application).
- Have a GT score of 100 or higher.
- Have two years of active service remaining after completion of the course.
- Meet height and weight standards IAW AR 600-9.

In addition, CONUS-based soldiers must have at least 24 months time on station before the class date they are requesting. CONUS-based soldiers should submit their request at least six months before their DEROS.

SPLC Graduates

Due to a computer conversion at TAPC, officers are not currently receiving completion credit for the Scout Platoon Leader's Course (SPLC). The conversion will be completed around March-June 1989. Until then, Armor Branch will build a file with the names of the officers who have completed SPLC and then load the Officer Master File when the conversion is completed.

It is imperative that officers verify the military education data on their ORBs after June 1989. If SPLC has not been annotated, the officer can go through his local MILPO with his course completion paperwork and have the course added to his ORB. POC at Ft. Knox, Ky. is CPT Lucier, Office Chief of Armor, AV: 464-5155/3188, or mail to Commandant, U.S. Army Armor School, ATZK-AR-P (CPT Lucier), Ft. Knox, Ky. 40121-5187.

Commanders' Photos Wanted for Display

The Command and Staff Department, USAARMS, is seeking color photographs, in Class A uniform, of all armor unit commanders, to include those who command battalions, squadrons, regiments, and brigades. The photos will be part of a new display at Boudinot Hall, Fort Knox.

The display will provide visitors, students, and faculty an opportunity to see who commands the Armor Force at the tactical level. Send photos to C&S Dept., USAARMS, ATTN: ATSB-CS-PDD-T (Captain Davis), Fort Knox, Ky, 40121.

Reunions

The 11th Armored Division reunion is scheduled for August 30 to September 2 at Rapid City, SD. For more information, contact Alfred Pfeiffer, 328 Admiral St., Aliquippa, Pa., 15001 (412-375-6295).

The Fourth Armored Division Association reunion is scheduled for July 20-22 at Stamford, Ct. Information is available from Samuel A. Schenker, Sr., 1823 Shady Drive, Farrell, Pa., 16121.

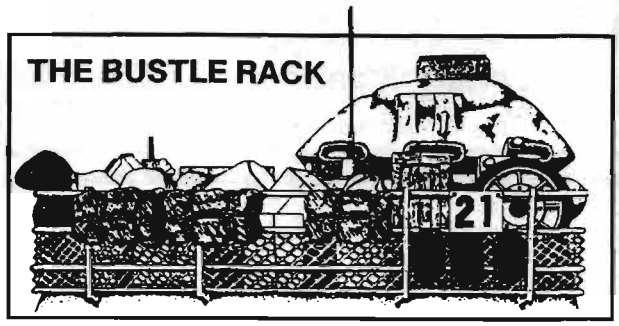
Vietnam veterans of the 2d Bn., 34th Armor are organizing a reunion in July 1990. Those seeking to attend should contact Pat Forster, 31861 Calle Winona, San Juan Capistrano, Ca., 92675 (714-493-4080).

The 11th Armored Cavalry's Veterans of Vietnam and Cambodia plan to gather in Minneapolis August 4-6 for Reunion IV. Information is available from Ben Hotchkiss, 17701 Kenyon Ave. W., Apt. 38, Lakeville, Minn. 55044 (612-892-7487).

Supporting the Excellence-in-Armor Program

To ensure success of the EIA program, the chain of command must use EIA soldiers appropriately, and carefully monitor their development and training. EIA soldiers should be assigned in advanced and challenging skill and leadership-development positions. Assigning an EIA soldier as a training clerk, jeep driver, or armorer does not capitalize on the ability and training these soldiers possess.

THE BUSTLE RACK



EIA soldiers will improve your unit's combat effectiveness. Work this important program to your benefit. EIA soldiers who pass the TCCT-II/SCCT-II will receive a certification of completion and a letter from the Chief of Armor. Soldiers must ensure this documentation is included in their personnel records. Fifty promotion points are authorized, in accordance with AR 600-200, Appendix B, Paragraph B-17 and B-17.1. Commanders should ensure their soldiers receive the promotion points.

POCs for this action are SGM Davis and MSG Merder, AV: 464-5155/3188.

USAARMS COFT Course for Senior Instructor-Operators

The Conduct of Fire Trainer (COFT) senior instructor/operator course is a three-week follow-on to the Master Gunner's Course. Most students will be master gunner graduates on orders to attend this course, but the senior I/O course is also open to those already qualified as instructor/operators. Some additional slots may open two weeks before the course opening dates.

The following is a listing of the remaining 1989 course dates for both the Master Gunner's Course and the Senior I/O Course:

Master Gunner Courses: 31 March - 16 June; 30 April - 14 July; 25 June - 12 September (for USAR and NG).

Senior I/O Courses: 25 April - 15 May; 22 May - 9 June; 19 June - 10 July; 17 July - 4 August; 15 August - 1 September; 13 September - 3 October.

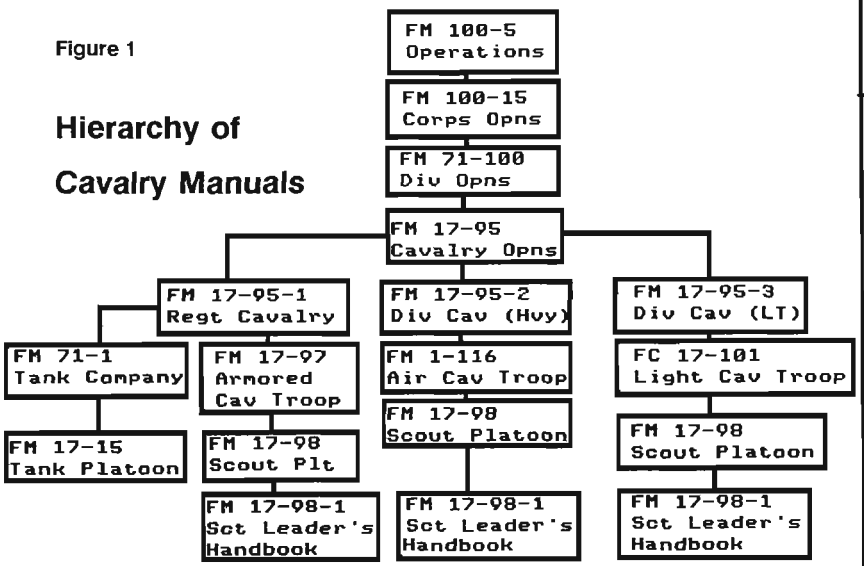
Additional information is available from Mr. Bell, USAARMS, ATTN: ATSB-WP-ASD, Fort Knox, Ky., 40121.

Cavalry Doctrine Update

Over the past year, cavalry doctrine has evolved into a hierachy of cavalry manuals (Fig 1). FM 17-95 is our "capstone" manual, and addresses principles and fundamentals for both regimental and divisional cavalry. This manual is

Figure 1

Hierarchy of Cavalry Manuals



supported by other field manuals, which address tactics, techniques, and procedures at each level down to platoon.

We are also developing a scout leader's handbook for use at the section level.

Some of these manuals are in print, and others are under development. FM 17-95 will be distributed Army-wide as a coordinating draft (CD) in April. FM 17-95-1 and FM 17-95-2 are under development, and plans were to distribute both as CDs in December. FM 17-95-3 will be the "how-to" book for light cavalry, and is currently fielded as FC 17-102, Reconnaissance Squadron. FM 71-1, Tank Company; FM 17-97, Armored Cavalry Troop; FM 1-116, Air Cavalry Troop; and FC 17-101, Light Cavalry Troop, are the company/troop-level manuals and are fielded. FM 17-15, Tank Platoon, and FM 17-98, Scout Platoon, were both printed in November 1987, and are also fielded. FM 17-98-1, Scout Leader's Handbook, is intended to be the "Ranger Handbook" for scouts. We hope to distribute a coordinating draft by April.

Mission Training Plans (MTP) will support each type and level of organization, from platoon to regiment. Our approach has been a bottom-up one, with the fielding of ARTEP 17-57-10 MTP, Scout Platoon; and ARTEP 17-237-10 MTP, Tank Platoon; in recent months. ARTEP 71-1 MTP, Tank and Mech Infantry Company/Team; FC 17-97-1 MTP, Armored Cavalry Troop; ARTEP 1-108-20 MTP, Air Cavalry Troop; and FC 17-101-1 MTP, Light Cavalry Troop; are the company/troop-level MTPs and are also fielded. At squadron level, only FC 17-102-1 MTP, Reconnaissance Squadron (LID), is in print. We hope to begin work on armored cavalry squadron and regimental MTPs in the next fiscal year.

Best Sellers

The following Armor proponent doctrinal and training literature, in DA print during FY88, is available to units and other agencies through the Baltimore Pinpoint Publication System:

FM 17-12-1, Tank Combat Tables - M1/M1A1 (Change 2, 30 Sep 88)

FM 17-12-2, Tank Combat Tables - M48A5/M60 Series (Change 1, 10 Nov 88)

FM 17-12-3, Tank Combat Tables - M60A3 (Change 2, 28 Sep 88)

FM 71-1, Tank and Mechanized Infantry Company Team (Revision, 22 Nov 88)

FM 71-3, Armor and Mechanized Infantry Brigade (Revision, 11 May 88)

ARTEP 17-57-10-MTP, Mission Training Plan, Scout Platoon (New, 27 Dec 88)

ARTEP 17-237-10-MTP, Mission Training Plan, Tank Platoon (New, 3 Oct 88)

ARTEP 71-1-MTP, Mission Training Plan, Company and Team (New, 3 Oct 88)

ARTEP 71-2-MTP, Mission Training Plan for the Tank and Mechanized Infantry Battalion Task Force (Revision, 3 Oct 88)

ARTEP 71-3-MTP, Mission Training Plan, Heavy Brigade Command Group and Staff (New, 3 Oct 88)

Reminder: You cannot obtain these publications unless your unit or the installation publication officer has an established and up-to-date publication account with Baltimore. The publication officer and clerk must have a copy, or access to, the most current DA Pam 25-33, The Standard Army Publications System (STARPUBS) Revision of the DA 12-Series Forms, Usage and Procedures.

Changes Coming for Reserve AOAC

The Armor Officer Advanced Course - Reserve Forces (AOAC-RF) is undergoing major revisions, especially in the resident phases.

The gunnery phase was deleted and a battalion/brigade task force phase will be added. The company/team tactics phase was augmented to serve as a company command module.

Phase I company/team tactics is the old Phase IV with eight hours of training management added. This phase will also serve as the company command module (CCM), which is a new initiative directed by the Department of the Army (DA) as part of its new Reserve Component Training Strategy. This resident phase will be offered four times in 1989. If a student is already enrolled in AOAC-RF, this Phase I substitutes for the old Phase IV, company/team tactics.

Phase IIa is the old Phase I correspondence study, minus eight hours of training management, which is now included in the new resident Phase I.

Phase IIB is Armor Branch correspondence study, which is a prerequisite for the new Phase III.

Phase III battalion/brigade task force operations and planning will be offered for the first time in 1990. This resident phase aligns AOAC with the AOAC 1990 resident 20-week course.

Diagnostic Basic NCO Course Nears End of First Year

In today's Army, noncommissioned officer responsibilities are greater than ever before. Our vehicles are filled with electronic equipment, and fault identification requires our mechanics to be as knowledgeable in these new system's operations as possible.

With the revision of the Basic Noncommissioned Officers' Course in July 1988 came the emphasis on greater alternate troubleshooting skills. Mechanics completing the course can troubleshoot complete systems accurately, and in less time.

Course criteria now includes the student's ability to use not only primary troubleshooting with test equipment, such as the STE-M1/FVS, but the ability to read electrical schematics and use them, along with a multimeter, to confidently diagnose malfunctions. Emphasis is on electronics and electrical theory.

The goal of diagnostic BNCOC is to train NCOs in motor pool operation, vehicle readiness, common soldier skills, leadership, supervisory skills, and combat operation.

Professional soldiers in the 63 career field realize the importance of completing DBNCOC for career progression. With the recent course revision, they are leaving Fort Knox more enthusiastic and confident in their own ability as mechanics, soldiers, and supervisors.

The 63E30 course length is 18 weeks, and the 63T30 course is 17 weeks, four days.

MILPERCEN selects and schedules BNCOC students, using the automated Student/Trainee Management System - Enlisted Phase II (STRAMS-EZ).

Logistics Training For Senior Officers

Previously known as the Senior Officers' Preventive Logistic Course, the Senior Officers Logistic Management Course (SOLMC) is an intensive 10 days designed specifically to provide detailed, up-to-date information and hands-on experience for commanders of tactical units.

Any senior officer interested in attending SOLMC should apply through command channels on DA Form 4187. Any civilian interested in attending should apply through appropriate CPO training channels.

Junior Officer Maintenance Course Prepares Supervisors

The Junior Officer Maintenance Course (JOMC) prepares company-grade officers and warrant officers for assignment to maintenance positions at the unit level, with emphasis on management and supervision of maintenance operations.

The course provides instruction on the preparation, use, and disposition of organizational maintenance forms and records; administrative control of licensing and dispatch; and the use and control of tools and test equipment.

It also provides instruction on repair parts supply, to include prescribed load lists; materiel readiness; battalion/squadron maintenance supervisors' responsibilities for planning, organizing, directing, coordinating, and controlling the organizational maintenance program; managing and performing scheduled maintenance services; familiarization with the components and function of vehicle systems; and power generator equipment.

Attendees must be commissioned officers (lieutenant or captain) who have completed any resident officer basic course, and warrant officers of any grade, except with PMOS 630A, 630B, 630C, 630D, or 630E.

Qualified officers wishing to attend JOMC should submit DA Form 4187 through supervisory channels. DA selects or approves those who attend the course.

The H8 ASI Vehicle Recovery Specialist Courses (B3 E/N/T)

This course trains enlisted personnel to operate and use recovery vehicles and equipment to recover track and wheel vehicles properly, without causing further damage to the disabled vehicle, and to do it safely. Students must be Active Army or Reserve Component personnel who have successfully completed 63 CMF entry-level resident training. The course puts emphasis on operating, servicing, using recovery vehicles, and the procedures used in recovery operations on track and wheel vehicles.

MOS-qualified field returnees will be given priority to attend these courses. Seats not utilized by field returnees are allocated to entry-level personnel completing the 63 Advanced Individual Training (AIT) Course at Fort Knox. The course length is two weeks, four days for 63 E/N and four weeks for 83T.

To submit personnel for these courses, contact: U.S. Army Armor School, DPT School Branch, Fort Knox, Ky., 40121

Basic Knowledge and Skills Training for CMF 63E/N/T10

For many years, CMF 63E/N/TI0 mechanics learned to perform isolated tasks with little or no explanation of why they were exchanging parts. Then feedback from the field began to indicate that lack of understanding of fundamentals made it difficult for mechanics to develop adequate troubleshooting skills or to transfer knowledge to new vehicles.

To remedy these shortcomings, the Maintenance Department at Fort Knox undertook a complete course rewrite, a Basic Knowledge and Skills program (BK&S). Following functional context, lessons are grouped by system, rather than by vehicle, and principles are taught just before they are needed for the performance of hands-on training. Training progresses from "whole-to-part-to-whole." the student is introduced to whole vehicles, to a specific system of those vehicles, to a specific component, and finally returns to the whole vehicle.

While previous training methods focused on how to replace parts, BK&S stresses troubleshooting, or determining which parts must be replaced and why. This program specifically emphasizes the interrelationship of components and systems, and relates similarities among vehicles, increases diagnostic training, includes training in an actual unit motor pool, expands technical and combat training in a combined AIT/BNCOC field training exercise, and provides a foundation for higher skill level training.

BK&S training began in April 1988. Validation is currently in progress. Feedback from students and instructors has been positive. Response to a similar program implemented in 1985 at Aberdeen Proving Ground indicates the BK&S-trained mechanics are better prepared to support the unit's mission. A field survey will be conducted to substantiate the effectiveness of Fort Knox's BK&S training.

If you have any comments or suggestions, please send them to: Director, Maintenance Department, U.S. Army Armor School, ATTN: ATSB-MATM, Fort Knox, Ky. 40121.

Army Chief of Staff Approves "Project Warrior" at Fort Irwin

Under a new initiative recently approved by the Chief of Staff of the Army, certain observer-controller positions at the National Training Center, Fort Irwin, will be coded as "Project Warrior" assignments. Officers in these positions will be assigned for two years as observer-controllers at the NTC, followed by another two-year assignment to a service school (Fort Knox, Fort Benning, Fort Lee, and Fort Huachuca). Service school assignments will depend on requirements at the end of the officer's Fort Irwin tour.

Eligible are branch-qualified captains with superior performance. Contact CPT Don Campbell or CPT Dennis Rogers at AUTOVON 221-9696.

New Scout Platoon Concept Will Test HMMWVs as "Stealthy" Scouts

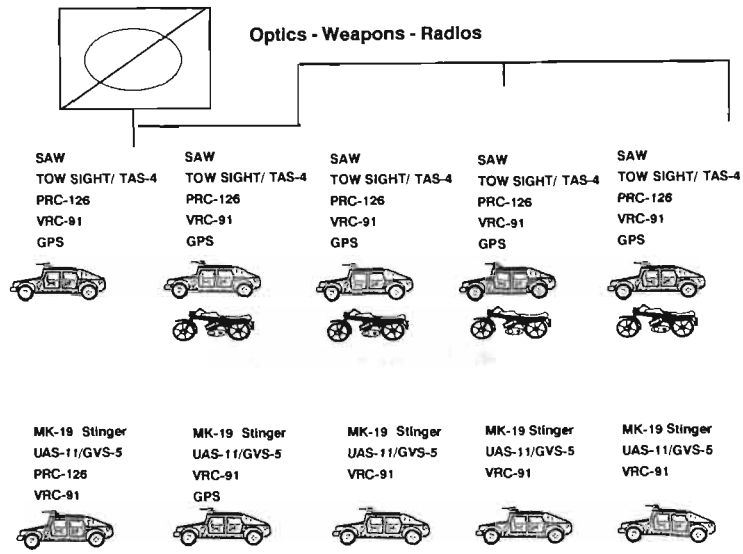


Figure 1.

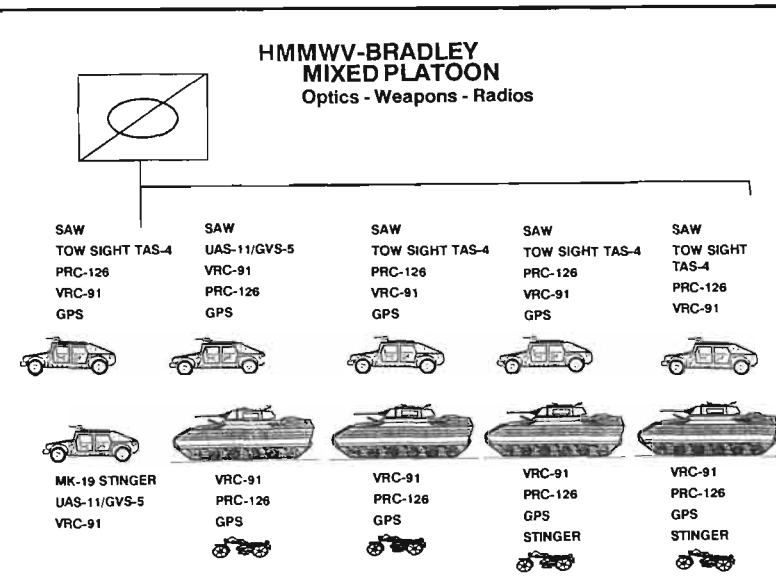


Figure 2.

The Armor Center has long supported the development of a reconnaissance vehicle that is smaller, quieter, and faster than either the Bradley Fighting Vehicle or the M113. These characteristics will be key elements in the design of the Future Reconnaissance Vehicle (FRV).

In the interim, we believe the HMMWV offers a stealth reconnaissance capability not available with the BFV or the M113, and may be a short term solution.

Several units have successfully used the HMMWV, instead of tracked vehicles, in their TF scout platoons during NTC rotations. The OPFOR at the MTC also uses the HMMWV as its primary reconnaissance vehicle and has been very effective.

The Armor Center and the 24th ID will conduct a focused rotation at the NTC in July-August 89, using two new TF scout platoon organizations (Fig 1 and 2). One task force scout platoon will be organized with ten HMMWVs and four motorcycles. Another will be organized with six HMMWVs, four BFVs, and four motorcycles. Both organizations should increase the capability and flexibility of the scout platoons to conduct reconnaissance. Prior to the focused rotation, the TEXCOM Armor Engineer Board will conduct an analysis and test of the two platoon organizations. Those results, together with the observations at the NTC during the focused rotation, will provide the basis for a recommendation on the organization and structure of armor and mechanized infantry battalion scout platoons.

Armor Branch Notes

SELECTION BOARDS

The U.S .Army Total Personnel Command (TAPC) announced the following dates for officer selection boards:

Army colonels, 21 February - 17 March; Army and CVI captains, 21 March - 21 May; Command & Staff College, 21 April - 21 May; RA Army, 20-23 June; Army lieutenant Colonels, 25 July - 25 August; senior service college, 29 August - 29 September; Army and CVI captains, 6-22 September.

SCHOOLING CHANGES

According to TAPC, Armor Branch no longer sends officers TDY enroute to CAS3, NBC Officers Defense Course, the S1 Course, or the S4 Course. If commanders want inbound officers to receive this training, they must procure a slot through training channels, and send the officer TDY and return.

NON-RESIDENT C&GS

Only 50 percent of all Armor officers selected for promotion to major will be picked to attend the resident C&GS Course. Armor Branch recommends that all promotable captains who are not selected for the C&GS resident course by their second try enroll in the non-resident course. To enroll, an officer must have eight years of commissioned service, graduated from resident OAC, and not have received a diploma from the course. Mail inquiries to: Commandant, USAC&GSC, ATTN: ATZL-SWE-R, Fort Leavenworth, Ks., 66027-6940.

BOOKS

Cavalier in Buckskin: George Armstrong Custer and the Western Military Frontier, by Robert M. Utley. University of Oklahoma Press, Norman, Okla. 1988, $19.95. 244 pages.

"Another book about Custer?" you may ask. There must be a small mountain of books, papers, and dissertations already gathering dust on shelves across the country on every angle of this subject. But the answer to the question is, "yes," because Robert Utley has written what may well turn out to be the most thorough, illuminating, authoritative single volume on the man to whom so much myth has attached itself that the truth is hard to find.

What we see emerge is a man of contradictions. For those in Custer's inner circle, his relatives and close friends, Custer was a magnanimous and courageous cavalry leader, but those on the outside perceived his callousness and cruelty. We see a man who, while on cavalry missions, also kept an eye toward finding gold and wrote under a pseudonym about Army matters for the New York newspapers. We see a man who never really made the adaptation from commanding Civil War soldiers who would follow a courageous leader to commanding the hodge-podge units of the frontier Army.

It is indeed unfortunate that Custer will forever be linked to one of the most disastrous battles in Army history, because that singular event has cast its shadow over what Custer was and what he did during the Civil War. Utley writes, "Had Confederate shrapnel struck him dead at Appomattox Station on April 8, 1865, he would be remembered as the great cavalry general that he was, second in the Union Army only to Sheridan. But in exchange for solid stature as a Civil War hero, known chiefly to the fraternity of Civil War students, he would have forfeited immortality as a folk hero of world wide renown."

Utley provides an excellent analysis of the ultimately tragic Little Bighorn campaign. In summary, "But one conclusion seems plain. George Armstrong Custer does not deserve the indictment that history has imposed on him for his actions at the Little Bighorn. Given what he knew at each decision point and what he had every reason to expect of his subordinates, one is hard pressed to say what he ought to have done differently. In truth, at the Little Bighorn Custer's Luck simply ran out."

Custer, at left, with Major General Alfred Pleasonton, in a photo taken three months after the battle of Gettysburg.

The illuminating picture of Custer is not the only one that Utley provides us. This is also the story of failure to adapt to the frontier and think like an Indian. It is the story of encroachment on Indian lands. It is the story of leadership and treatment of soldiers in peace and in battle. And it is the story of politics and maneuvering at high echelons.

Cavalier in Buckskin, which is the first volume in a series called the Oklahoma Western Biographies, flows superbly with none of the dryness that usually accompanies military biographies. The 24 pages of photographs and eight maps contribute to the understanding of Utley's narrative. I am not sure for whom Utley wrote this book, but military men, laymen, and Custer buffs should find it equally informative and enjoyable.

MAJ Patrick J. Cooney
Editor-in-Chief
ARMOR

Embattled Courage, by Gerald F. Linderman, The Free Press, New York, N.Y., 1987. 314 pages. $22.50.

If you are unfamiliar with the Civil War and really don't know much about the struggle, don't read this book. Embattled Courage is, however, must reading for anyone who studies the War Between the States as a historian or just as a hobby.

Embattled Courage is not another book that discusses assaults, charges, and campaigns. It tells of the pain, the convictions, and the courage of the soldiers who fought this bloody conflict. Embattled Courage describes the feelings of people who enter a war with their values held high, only to have their own beliefs eroded away as the campaign dragged on.

Gerald Linderman does an excellent job of painting the emotional picture of this struggle. He covers in great detail the at-

"The diary paints the picture seen by the typical enlisted man - the pleasure of a hot meal, and a warm, dry bed, the misery of doing without those things."

titudes of both Confederate and Union soldiers as they entered the war, fighting for duty, honor, and country. Their greatest weapon was their courage, and their greatest fear was cowardice. Linderman describes the attitude during those first years, both at home and on the front, as one of total commitment to the fight. Everyone believed that they were fighting for their values, and that bravery would conquer all.

As battles became campaigns, and months became years, convictions lessened their grip, and emotions became tainted with reality. Linderman captures the transformation of the fight through the eyes of the participants as they faced hardship, disease, and death. To the soldiers, the values that had brought them to battle had betrayed them, and the support from home was uncertain. At home, families began to question whether the end justified the means, as casualties mounted. The war, once a crusade for justice, had become a painful tragedy.

Linderman continues his emotional portrayal through the end of the war and on into reconstruction. He describes the post-war era as one of intense personal adjustments. The grim realities of armed conflict were difficult for most veterans to accept, let alone describe. The adjustments were more than just returning after an extended leave. To the soldier, foraging was again stealing, killing was suddenly again murder, and the coarse lifestyle of military camps could not be tolerated at home. Veterans found that the easiest way to readjust was to block the unpleasant experiences from their lives. Often this lack of communication by veterans was regarded as "heroic modesty" by family members and friends.

Soon the unpleasantries of the war became more widely known and understood. This knowledge fueled a growing sentiment of detachment from recent events. The original values and ideals that prompted an entire nation to pit brother against brother were lost in the realization that the war was a travesty and could have been avoided altogether had cooler heads prevailed. As the nation searched for answers, public resentment toward the military increased. The military became associated with ineptitude and was a prime target of public ridicule. Both publicly and militarily, there was no feeling of accomplishment, no winners, no victory, only the losses.

As Linderman points out, the attitudes that followed the war were to be short lived. Within a generation, sentiments toward the war became more positive. Stories of romantic, heroic adventures replaced the grim realities of the war as the country remembered those troubled times. Veterans organizations swelled in ranks, and to have fought for a cause was again noble.

Modern historians might be able to draw a parallel between the War Between the States and our involvement in Southeast Asia. Both were well supported in their early years, only to have the public start to question the conflict. The outcomes could not be considered victories, and each conflict was followed by a period of public resentment. Within a decade, however, opinion changed, and the veteran was looked upon with favor.

Embattled Courage is not your typical military history book. Its coverage of the attitudes and feelings during this crucial period of our history offers different insights to the way the war was fought. Understanding the emotions of the soldiers, the families, and the nation will help you better understand the leadership of the war and the decisions the leaders made. Read Embattled Courage and see the Civil War through a different set of eyes.

CPT Robert P. Johnson
Fort Monroe, Va.

The Incredible Year, by Donald J. Willis. Iowa State University Press, Ames, Iowa, 1988. 159 pages, $16.95 (Hardcover), ISBN 0-8138-1036-1.

Someone once said it was against regulations to have a diary in combat zones. The logic was that the diary might fall into enemy hands, and the content might prove of use to the enemy.

Certainly, in the Pacific Theater of war, and in other fights, the diary has proved a valuable source of information to the intelligence section. On the other side of the coin is something like Willis' diary. It is the tool of historians - the first-hand account of the participant to the events described.

Willis is of another age or period of America; yet, his is a typical story. It is the America of the national emergency, the war that all draftees disliked, but served in well, the war General Dwight D. Eisenhower called "the Crusade in Europe." Willis served in the 67th Field Artillery, 3rd Armored Division, as a .50-cal. machinegunner on an M3 halftrack. He worked later in a supply train. His combat time went from joining the OVERLORD invasion force, shortly after lodgment on the Normandy beaches, to the final battles in Germany. He participated in the St. Lo Breakout, Argentan/Falaise Gap, the thrust across western Europe, the Battle of the Bulge, the Siegfried Line, and the dash into the heartland of Germany.

The diary paints the picture seen by the typical enlisted man - the pleasure of a hot meal, and a warm, dry bed, the misery of doing without those things. There are the thrills of victory, the occasional movie, the pass to Paris, the fear of German armor, the terror of the ambush, the loss of buddies, and the plain gnawing feeling that, at any moment, it would all be over. Willis shares the reactions and thoughts he had as a 22-year-old involved in a campaign that consumed a year of his youth.

For the military historian, there is the social history, the description of elementary tactics, and the views from the foxhole. It's the little fellow's war, as seen by one who waged it. Here was a generation whose youth should have brought all that the young desired, but instead, they found death, horror, and sights of man's inhumanity to man.

The practical person would see instead the writings that might be used by any intelligence analyst examining the musings of a soldier - the knowledge that the air was theirs (most of the time), that somehow, numbers would overwhelm the quality possessed by German armor, the fear of enemy stragglers hitting supply columns, and the fanatic, diehard defense that only threatened the soldier's chance of going home after surviving "this far," while doing little to alter the obvious outcome. Maybe the obvious, but, confirmed again.

The Incredible Year is a saga that many Americans of varying generations have had to live over and over again since the beginning of this nation. Willis lets us know that WWII was no different.

Peter Charles Unsinger,
San Jose State University

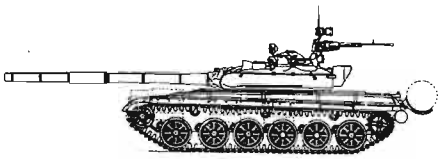
T-72
SOVIET TANK

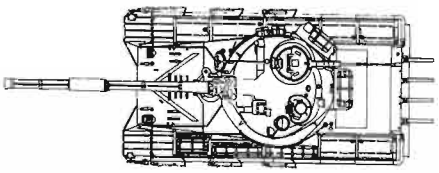
T-72

T-72M

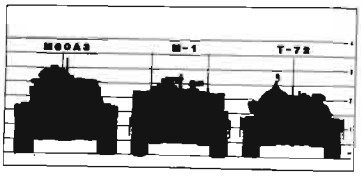
M1981/3 T-72M1

T-72





M-1986



M-1986 W/REACTIVE ARMOR STUDS

Users (countries): Algeria, Bulgaria, Cuba, Czechoslovakia, East Germany, Finland, Hungary, India, Iraq, Libya, Poland, Romania, Syria, Soviet Union and Yugoslavia

T-72

basic T-72 appeared with an optical rangefinder, and four-part track skirt plates as on T-64.

T-72M

appeared with full track skirts, smoke grenade launchers (seven on left, five on the right at turret front) and no right-hand optic indicating presence of a laser rangefinder. This version is for export.

M-1981/3
T-72M1

M1981/3 as well as similar vehicle T-72M1 shows a thicker upper glacis (evidenced by three, rather than four traverse ribs in front of the driver's hatch), increased frontal turret armor and applique armor on the turret roof. It is now the standard model for Soviet units equipped with the T-72.

M-1986

first appeared in November 1986 Moscow parade and displayed increased frontal turret protection over the M-1981/3, but, like the modified T-64B, it shows several components have been moved for the attachment of reactive armor. Eight smoke grenade projectors are mounted on the left rear side of the turret, storage boxes shifted, and there are only two traverse ribs on the upper glacis.

T-72 CHARACTERISTICS

Medium Tanks	
MAIN ARMAMENT	
CHARACTERISTICS	T-72
CALIBER (mm)	125
TYPE	smoothbore tank gun
ELEVATION (°)	-6 to +14
RATE OF FIRE (rd/min)	6-8
AMMUNITION (types)	Frag-HEFSD, HEAT-FS, HVAPFSDS
MAXIMUM RANGE (APFSDS) of aimed fire (m)	4,000
EFFECTIVE RANGE 50% Ph (m)	2,100
ARMOR PENETRATION (mm @ 0° obliquity @ 1,000 m)	400 + (HVAPFSDS); 500 + (HEAT-FS, any range)
BASIC LOAD (rd)	40

VEHICLE CHARACTERISTICS	T-72
CREW	3(commander, driver, gunner)
WEIGHT (mt)	41.0
LENGTH	
Gun forward (m)	9.50
Without gun (m)	6.90
WIDTH, Overall (m)	3.46
HEIGHT, Overall (m)	2.30
ENGINE	V-12,780hp, diesel
SPEED (Maximum)	
Road (km/hr)	80
Water (km/hr)	N/A
FUEL CAPACITY (liters)	1,200
ROAD RANGE (km) (on unimproved roads)	400 (510 w/aux. fuel tanks)

TRENCH CROSSING (m)	2.70
VERTICAL STEP (m)	0.80
GRADEABILITY (°)	30
FORDING (m)	1.4; 5.5(w/snorkel)
ARMOR (Maximum)	
Hull (mm)	greater than T-62
Turret (mm)	greater than T-62
INFRARED	
Driver	yes
Gunner	yes
Commander	yes
NBC PROTECTION	filtration and over-pressure system and PAZ radiation detection system
DOI	early 1970s
STATUS	standard

SECONDARY ARMAMENT	
CHARACTERISTICS	T-72
NUMBER/TYPE	1/7.62mm coaxial AA machine gun
MODEL	AGS17
CALIBER (mm)	12.7
MAXIMUM RANGE (m)*	7,000
EFFECTIVE RANGE (m)	1,500 (AA); 2,000 (ground)
ARMOR PENETRATION (mm @ 0° obliquity @ 500 m)	20
PRACTICAL RATE OF FIRE (rd/min)	100
BASIC LOAD (rd)	300

PRIMARY VARIANTS

SECONDARY ARMAMENT	
CHARACTERISTICS	T-72
NUMBER/TYPE	1/coaxial machine gun
MODEL	PKT
CALIBER (mm)	7.62
MAXIMUM RANGE (m)*	4,000
EFFECTIVE RANGE (m)	1,000
ARMOR PENETRATION (mm @ 0° obliquity @ 500 m)	8
PRACTICAL RATE OF FIRE (rd/min)	250
BASIC LOAD (rd)	2,000

This 24-by-27-inch poster of the Soviet T-72 Tank is the third in a series on Soviet tanks, armored vehicles, helicopters, and ATGMs to be produced by Threat Division, Directorate of Combat Developments, Fort Knox. Units may request copies by phoning Army-Wide Training Support Branch at AV 464-2914/5848 or 502-624-2914/5848.

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