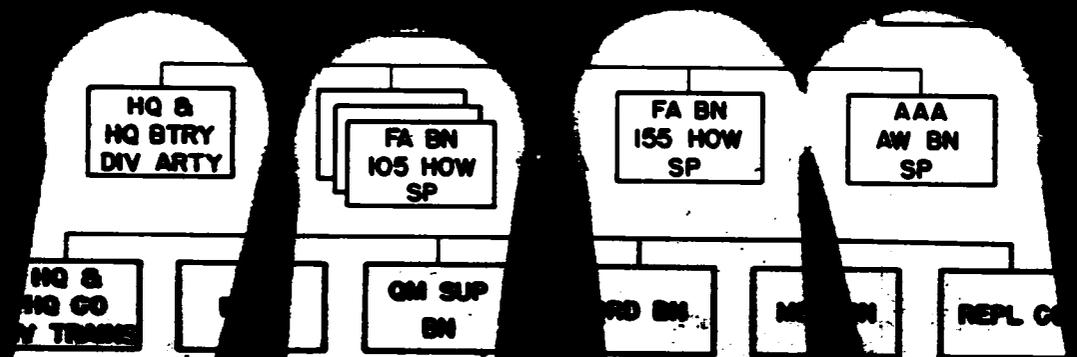


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[See Page 32]

MAY-JUNE, 1951



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ARMOR

Continuation of THE CAVALRY JOURNAL

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LETTERS to the EDITOR

Balanced Ground Forces

Dear Sir:

Your editorial on page 13 of the January-February issue strikes a responsive chord in the heart of this reader who from his OP (which may be more aptly described as an observation slit) in Moscow, is far out of touch with developments on the free side of the Curtain, but thanks to ARMOR gets a picture of the trend. Therefore please accept a pat on the back for your splendid publication and the following comments from an armored devotee since the days when a cavalryman not astride a four-legged horse was a heretic.

If we eliminate political, psychological and economic factors, the history of land warfare on both Eurasian and American continental mainlands (World War II in the Pacific was magnificent but special) shows success attending armies properly balanced between the less mobile but larger powerful mass (Infantry units) and the more mobile but generally smaller striking force (Cavalry—now Armor—units). Proper balance varies with situation, terrain, armament and other factors. The all-important element of leadership which understands how to coordinate these two forces and get the maximum from both is indispensable.

World War I witnessed both the death of horse cavalry in the tragic stalemate of the Western Front and the birth—unrecognized until after the war—of mechanized cavalry (recently redesignated Armor). But the principles referred to above were once again amply proven in a secondary theater in Palestine by the magnificent campaigns of Allenby. He was a master of grand tactics who in spite of modern war's almost prohibitive odds against the horse on the battlefield, masterfully combined the massive but less mobile weight of infantry with the more mobile striking power of cavalry.

Thanks to the invention of the iron horse and the foresightedness of our more mobile-minded leaders, we were prepared in World War II with a balanced force with whose success all are familiar. This is the more noteworthy in that success was attained in the same theater that saw the failure of the unbalanced armies of World War I.

Careful analysis, far beyond the scope of this letter, will show that successful application of the principles of mobility demands an organization in which both the less mobile (infantry) and more mobile (armor) elements are in divisional strength when the whole force is a corps or larger. Further analysis shows that an "all-purpose" division is tactically unsound. The so-called mechanized division is analogous to the old term "mounted infantry." It has strategic advantages and logistical disadvantages. There is no cheap substitute for the armored division organized and

trained to fight mounted and capable of fighting dismounted.

As long as warfare is conducted on the earth's surface it is safe to predict that there will be a need for these two basic elements. It matters not whether either or both reach the battlefield by water, air or land. What does matter is how they fight.

Armored support, chiefly in the form of tanks, is an essential element of the infantry division. As such it supports the infantry action, it may and should increase the infantry's mobility, but in the end it is and must remain infantry. The armored division on the other hand



Major General R. W. Grow.

predicates its tactics on the mobility of the tank which here is the basic element and all other elements are organized, equipped and trained to support mounted action. Armored infantry, artillery and engineers require iron horses capable of modern battlefield maneuverability. Parenthetically: I agree with the caption under the title "Armored Infantry is Different" on page 40 of the January-February issue but I fear

the author has missed the real "difference." Armored infantry must be trained to FIGHT mounted. Opportunities to do so will not be often but they will be decisive. I found them to be surprisingly frequent in Europe and found the tempo of the entire operation depended upon the skill and spirit with which the small infantry unit attacked mounted, firing "from the hip," and the alacrity with which all or part of the armored infantry could switch from mounted to dismounted to mounted action. This inherent ability coupled with the fact that in armor it is the tank, not the infantryman, which sets the pace, is what differentiates between the two basic combat elements. Difficult to put in words and impossible to understand unless developed by long training is the "difference."

Other conditions being equal the army with the better balance between infantry and armored divisions will win. Under present conditions in Europe not less than one-half of the divisions should be armored. The U. S. is best able to furnish (and certainly second to none in ability to employ) the armored-division component of any combined force.

The current emphasis on small armored units which your editorial very properly found so disturbing is doubtless due to the peculiar conditions of the Korean war. It is to be hoped that the lessons of large scale land operations in Europe are not forgotten and that the balance of the army is sufficiently weighted with armored divisions to insure the army commander mobility and freedom of maneuver in combat. There is no substitute for battlefield mobility, by which the commander can retain the initiative and overcome a stronger but less mobile enemy. Conversely there is no means so effective to counter a highly mobile enemy. Modern weapons and equipment both dictate a higher ratio of armored to infantry divisions than World War II.

MAJ. GEN. R. W. GROW
Army Attaché
Moscow, Russia

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Rates: See bottom of contents page.

ARMOR—May-June, 1951

The Working Level

Dear Sir:

May I pass along the comment that I believe ARMOR is an outstanding publication. I appreciate the freshness of its appearance and the value of the content.

However, and I know this will be familiar to you, I would like to see more articles down on the company-battalion level. After all, the only way for younger officers to learn from the experience or knowledge of the older, wiser ones is to read or hear of them. And since their reticence is well established, the only hope lies with ARMOR.

LT. JOHN FERGUSON
4th Reconnaissance Battalion
APO 174

● We'll put our trust in this very issue to carry out the wishes of Lieutenant Ferguson. May we add one thought: the article signed by a senior officer is able to be chock full of a career of experience gained in all the grades, experience that supplies some good groundwork for junior personnel.—Ed.

More On Russian Tanks

Dear Sir:

Referring to Generalmajor H. B. Mueller-Hillebran's letter in your Jan-Feb '51 issue on The Use of Soviet Tanks by the Germans, and the "poor quality" opinion of Mr. Garrett Underhill which occasioned his letter, the following German opinions on Russian tanks quoted from *The Other Side of the Hill* by Liddell Hart are of particular interest:

"Russian equipment was very good, even in 1941, especially the tanks. Their T34 was the finest in the world."

F. M. Von Kleist.

"The Russians maintained their advantage in tank design: the Stalin tank, which appeared in 1944, was the best tank that was seen in battle, anywhere, up to the end of the war."

Gen. Von Manteuffel.

CAPT. C. L. PROUDFOOT
Editor
Indian Armoured Corps Journal
Ahmednagar, India

How Are Things in Korea?

Dear Sir:

I receive your informative and artistic magazine indirectly every two months and read it with interest. However, getting down to business, I have two things to discuss with you.

The first one is—have there been any figures on our tank losses in Korea since the first M24s went into action? If so, I wish you would inform me of the figures.

Next, I consider the M4A3E8 a good tank but still slightly inferior to the T-34 considering that the T-34 with its old gun (76) was good enough to set a Mark V back on its bogies. The new version of the T-34 has an effective 85mm gun. Now, an M4 was some-



An M4A3E8 at work in Korea.

what inferior to the Mark V and it took a good M4 tankman to put a Mark V out of commission. If the T-34 was better than the Mark V and the M4A3E8 inferior to it, how would things go in Korea?

I think we've been lucky to have our splendid tankmen in those grease traps. If I were the Supreme Commander I'd put more M46s in there. I have no faith in any other tank.

ROBERT GRAHAM

Morristown, New York

● Master Robert Graham, 12-year-old son of an Armor Reserve Officer, has advanced some sound comment. What may be said on our tank losses was set forth by Col. Withers, Armor Officer, Eighth Army, in his letter and article of last issue. We recall his remark that "the M4A3E8 has not failed to demonstrate its superiority over the T-34," and "M4A3E8 crews like their tanks."—Ed.

Mounted Service Museum

Dear Sir:

The Association plan to join in sponsoring a museum of the mounted service is most worthwhile.

I have several items which I am desirous of contributing when the moment for assembling the historical items arrives, including two lances, once carried by Bengal Lancers.

In earlier days at Fort Riley I donated a number of items of historical worth to the Cavalry School collection. Some of this I more recently have heard has disappeared. I hope that the Cavalry library and other items may be secured for the museum.

LT. COL. LEON K. KURLAND
3d Armored Division
Fort Knox, Ky.

Dear Sir:

As a former Cavalry Reserve Officer who was fortunate enough to attend the Cavalry School, I think your idea of a Mounted Service Museum is excellent.

Many former horse Cavalrymen might like to belong to an organization sponsoring the museum.

I have a collection of Cavalry and Army songs on records in which I am missing the famous Garry Owen song. I wonder if any of your readers can give me a lead on where to secure it?

ALEX B. McDONELL
Lt. Col. CE USAR

Dallas, Texas

● Those with information pertaining to the museum project may address Colonel Geoffrey Galwey, chairman of the Association committee concerned with the details, in care of the Headquarters.—Ed.

From Here to E... Where?

Dear Sir:

I regret my inability to submit a review of *From Here to Eternity* as you requested.

The review copy is being returned to you after careful reading to try to find something worthy of publication.

There is nothing even remotely approaching literature in this compilation of 800 pages of filth; the Army is used as the carrier for acquainting the reader with words, expressions and scenes heretofore considered below the level of any standard of decency respected by American publishers.

This book has been well merchandised and no doubt the market will be expanded to reach all teen-agers. A low priced paper back edition will no doubt appear soon.

I would not have been surprised to find a notice on the back flap, "Send 50 cents for a complete set of GEN-U-WINE postcards."

HERBERT H. FROST
Colonel, USAR

Washington, D. C.

● With Colonel Frost's permission ARMOR passes along his reaction to the recent and much-discussed novel.—Ed.

ARMOR

THE COVER

Many of the leading exponents of mobile warfare have decried the fact that we have never attained mobility in the true sense in our armored divisions. Pointing to the tremendous excess with which the division is burdened, and to the large number of wheeled vehicles which keep it roadbound, they advocate a paring down and a switch to full tracks throughout. The T18E2 armored personnel carrier is a step toward the greater mobility that has been advocated.



ARMOR—May-June, 1951

A ROLE, NOT A WEAPON

The Army has just announced the alerting of the Second Armored Division at Fort Hood, Texas, for shipment overseas, to become the 12th division of General Eisenhower's building forces for the defense of Western Europe.

The famous "Hell on Wheels" division joins the U. S. Constabulary (considered roughly equivalent to an armored division), France's Fifth Armored Division, and Britain's Seventh and Eleventh Armored Divisions, in providing armor backbone and mobility which draw additional strength from a separate British armored brigade and the organic tank units of the infantry divisions which are a part of the NATO forces.

Thus the Western World prepares the strength to meet any aggression. It is gratifying to see the proportion devoted to the major mobile unit, the armored division; and particularly so when considered against the history of war on the Continent.

It seems that another step in the right direction might well be the reorganization of the Constabulary into a true armored division. Its background of organization, in which figured the First and Fourth Armored Divisions, and its fine record in foreign service under such distinguished commanders as Generals Harmon and White, provide an appropriate backdrop for its reconstitution as, for example, the Fourth Armored Division.

The armored division is a combined arms team requiring considerable time to organize, train and equip. For that reason, an acceptable proportion of operational-type divisions must be in readiness to meet the immediate requirements of any emergency.

The assignment of the Second Armored Division to the NATO forces: the reactivation of the First Armored Division; the purposeful tank program; the fast action on the T-41; the development of the new personnel carrier; all of these things join in pointing up the recognition of the requirement for mobility in modern war, a requirement that has its ultimate and timely confirmation on the field in Korea.

The major instrument of mobile warfare today, the tank, has been widely discussed, by experts and others. Much of the criticism goes to such great lengths to list the many measures of defense against the tank that, in sum, it serves to establish a strong case on behalf of the weapon that is effective enough to require all of these countermeasures. And few of the critics come forward with proposals as to what will take the place of the tank in providing tactical and strategic mobility on the battlefield.

Natural and man-made obstacles, mines, antitank weapons and airplanes have not stopped armor any more than the rifle and artillery have stopped the foot soldier.

In the light of the present, ground warfare requires a team. That team consists of armor, artillery, infantry and tactical air. Armor's job in that team is to provide it with mobility, fire power and shock. Armor's major tools for accomplishing that job are the armored division and the medium tank.

ARMOR, as the focal point of professional interest in mobile warfare, would call attention to the basic fact that the point of overriding importance is not a weapon, but a role.

Award of the Medal of Honor

President Truman, in a special ceremony at the White House on Armed Forces Day, May 19, pinned the Medal of Honor, the nation's highest award, on three Army veterans of the Korean campaign. The citation accompanying each award follows:

First Lieutenant Dodd (then Second Lieutenant), Company E, 5th Infantry Regiment, distinguished himself by conspicuous gallantry and intrepidity above and beyond the call of duty in action against the enemy near Subuk, Korea, on 30 and 31 January, 1951. Lieutenant Dodd, given the responsibility of spearheading an attack to capture Hill 256, a key terrain feature defended by a well-armed, crafty foe who had withstood several previous assaults, led his platoon forward over hazardous terrain under hostile small-arms, mortar, and artillery fire from well-camouflaged enemy emplacements, which reached such intensity that his men faltered. With utter disregard for his own safety, Lieutenant Dodd moved among his men, reorganized and encouraged them, and then singlehandedly charged the first hostile machine-gun nest, killing or wounding all its occupants. Inspired by his incredible courage, his platoon responded magnificently and, fixing bayonets and throwing grenades, closed on the enemy and wiped out every hostile position as it moved relentlessly onward to its initial objective. Securing the first series of enemy positions, Lieutenant Dodd again reorganized his platoon and led them across a narrow ridge and onto Hill 256. Firing his rifle and throwing grenades, he advanced at the head of his platoon despite the intense, concentrated hostile fire which was brought to bear on their narrow avenue of approach. When his platoon was still 200 yards from the objective he moved ahead and with his last grenade destroyed an enemy mortar, killing the crew. Darkness then halted the advance but at daybreak Lieutenant Dodd, again boldly advancing ahead of his unit, led the platoon through a dense fog against the remaining hostile positions. With bayonet and grenades, he continued to set the pace, without regard for the danger to his own life, until he and his troops had eliminated the last



President Truman and Medal of Honor recipients at the White House ceremony on Armed Forces Day. L. to R., Lt. Dodd, Sgt. Pittman and Sgt. Kouma.

of the defenders and had secured the final objective. Lieutenant Dodd's superb leadership and extraordinary heroism inspired his men to overcome this strong enemy defense, reflecting the highest credit upon himself and upholding the esteemed traditions of the military service."

• • •

"Sergeant Pittman, 2nd Platoon, Company C, 23rd Infantry Regiment, distinguished himself by conspicuous gallantry and intrepidity above and beyond the call of duty in action against the enemy near Kujang-dong, Korea, on November 26, 1950. He volunteered to lead his squad in a counterattack to regain commanding terrain lost in an earlier engagement. Moving aggressively forward in the face of intense artillery, mortar and small-arms fire, he was wounded by mortar fragments. Disregarding his wounds, he continued to lead and direct his men in a bold advance against the hostile strong point. During this daring action, an enemy grenade was thrown in the midst of his squad endangering the lives of his comrades. Without hesitation, Sergeant Pittman threw himself on the grenade and absorbed its burst with his body. When a medical aid man reached him, his first request was to be informed as to how many of his men were hurt. This intrepid and selfless act saved several of his men from death or serious injury and was an inspiration to the entire command. Sergeant Pittman's extraordinary heroism reflects the highest credit upon himself and is in keeping with the esteemed traditions of the military service."

• • •

"Master Sergeant Kouma [at right in photo] (then Sergeant First Class), a tank commander in Company A, 72d Tank Battalion, distinguished himself by conspicuous gallantry and intrepidity at the risk of his life above and beyond the call of duty in action against the enemy in the vicinity of Agok, Korea,

on 31 August and 1 September 1950. His unit was engaged in supporting infantry elements on the Nakdong River front. Near midnight on 31 August a hostile force estimated at five hundred crossed the river and launched a fierce attack against the infantry positions inflicting heavy casualties. A withdrawal was ordered and his armored unit was given the mission of covering the movement until a secondary position could be established. The enemy assault overran two tanks, destroyed one and forced another to withdraw. Suddenly Sergeant Kouma discovered that his tank was the only obstacle in the path of the hostile onslaught. Holding his ground he gave fire orders to his crew and remained in position throughout the night fighting off repeated enemy attacks. During one fierce assault the enemy surrounded his tank and he leaped from the armored turret exposing himself to a hail of hostile fire, manned the .50 caliber machine gun mounted on the rear deck and delivered point-blank fire into the fanatical foe. His machine gun emptied, he fired his pistol and threw grenades to keep the enemy from his tank. After more than nine hours of constant combat and close-in fighting, he withdrew his vehicle to friendly lines. During the withdrawal through eight miles of hostile territory, Sergeant Kouma continued to inflict casualties upon the enemy and exhausted his ammunition in destroying three hostile machine-gun positions. During this action Sergeant Kouma killed an estimated two hundred fifty enemy soldiers. His magnificent stand allowed the infantry sufficient time to re-establish defensive positions. Rejoining his company, although suffering intensely from his wounds, he attempted to resupply his tank and return to the battle area. While being evacuated for medical treatment his courage was again displayed when he requested to return to the front. Sergeant Kouma's superb leadership, heroism and intense devotion to duty reflect the highest credit upon himself and uphold the esteemed traditions of the Army of the United States."

training

the Armored Infantry Platoon Leader REINFORCED

*On the training field—the framework for
tank-infantry teamwork at platoon level*

by CAPTAIN CHARLES W. KOBURGER, JR.

LORD, what do I do now? . . . This silent prayer is offered up many times during every platoon leader's service. For the beginnings of an answer he must go to the Field Manuals, which give the general rules; and to those who have worked out solutions to similar problems (and have lived to tell about them). Here are a few of the tips and rules of thumb, some borrowed from the Field Manuals, some not, and all of which have proved useful to platoon leaders who have gone before.

To begin, your armored infantry rifle platoon consists of three rifle squads and one light machine gun squad (two M-1919A6s), and your platoon sergeant and you. Each squad has an armored personnel carrier (APC): you ride in one of these and the platoon sergeant usually rides in another. Your attached tank platoon consists of five tanks: two sections of two tanks each, and the platoon leader's tank. The platoon leader usually commands the first section (giving it in effect three tanks), and the platoon sergeant commands the second section.

The armored infantry platoon leader whose mission reinforces him with a platoon of tanks should be guided by two general principles. He should have read the manuals, which give him the framework of basic knowledge on his special subject, and he should use SOPs. The latter minimize confusion in combat. They save time when time really counts. They give impetus to solution of unusual problems. The British, for example, have had great success with their battle drill: it shows every man where he fits, what he is to do, when he is to do it.

FIRE POWER—you have it . . . use it! Your attached tank platoon should liberally hose down every likely clump of bushes with bow and coaxial machine guns. The personnel carrier should do the same with their weapons. Against such fire, very few enemies are going to try to fire a rocket launcher.

MOBILITY—you have it . . . use it! Everyone can ride, and should ride where it is possible. Keep moving! This decreases the time of exposure to enemy fire and makes you a difficult target for enemy guns. It also assists you in attaining tactical surprise.

SHOCK—if you apply your fire power and mobility properly, you will have shock. Beat the enemy over the head with everything you can bring to bear—guns, small arms, artillery, air—and in the attack of counterattack, overrun him before he can recover. Hit fast and hard. The manuals are right.

Captain Charles W. Koburger, Jr., served with the 11th Armored Infantry Battalion of the 1st Armored Division in the Italian Campaign. A graduate of Infantry OCS in 1943, he is now Communications Officer of the 67th Medium Tank Battalion, 2d Armored Division, Fort Hood, Texas.

Some SOP's

Working with tanks—infantry dismounted:

good observation and fields of fire—tanks lead 100 to 200 yards.

poor observation and fields of fire—tanks and infantry move together.

no observation or fields of fire—infantry leads by 50 to 100 yards.

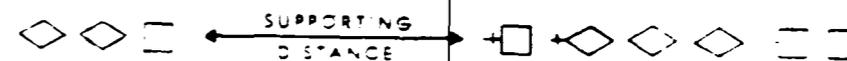
Working with tanks—infantry mounted:

tanks always lead.

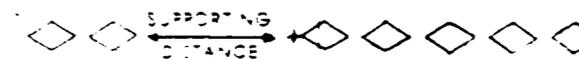
Some Formations

Two good standard formations for a reinforced infantry platoon acting as leading element in mounted approach march:

1. Infantry in carriers (preferred).



2. Infantry on tanks (sometimes necessary).*



1st & 2d tanks: no riders

3d tank: infantry squad leader & rifle squad

4th tank: rifle squad

5th tank: rifle squad

6th tank: 1/2 light machine gun squad

7th tank: 1/2 light machine gun squad & infantry platoon

A good formation for an infantry platoon reinforced with a platoon of tanks and acting as leading element with point dismounted:

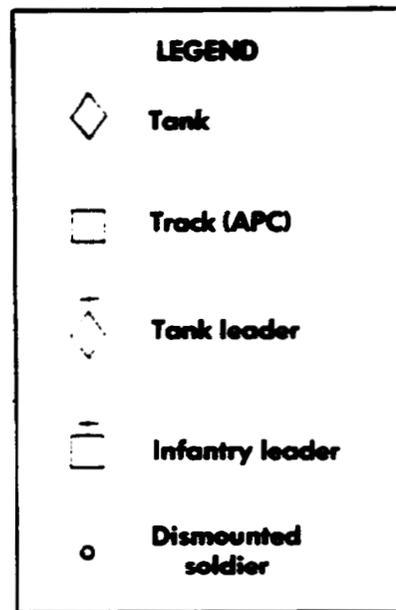


When you are halted during a march, are not in the lead and not engaged, coil your platoon. Form your perimeter well off the road. Your tanks cover the most likely avenues of approach, your tracks the others, in order of

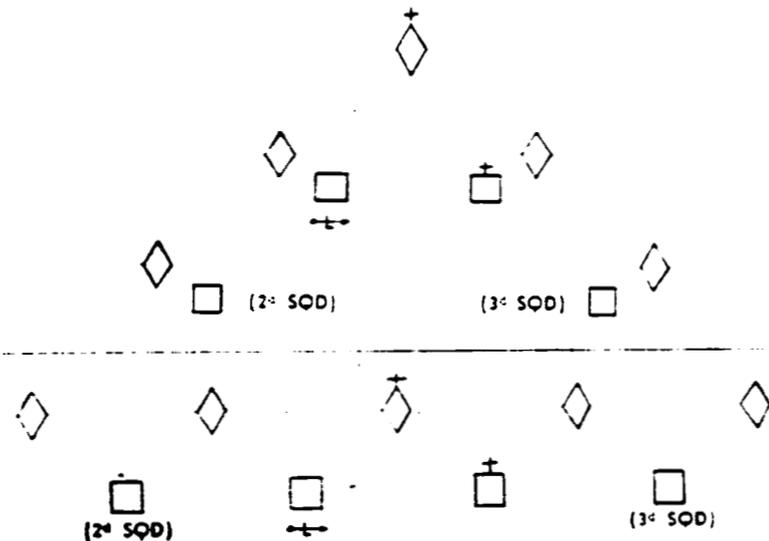
priority as far as they will go. Dismount and send out local security (not more than 50 to 100 yards). Keep well dispersed and use available concealment to the maximum.

*Never mount infantry on first two tanks: use two tanks for point and mount the infantry platoon on remaining five tanks.





The next formation is offered with some reservation, since any tactical movement across country—contact imminent—should flow through the low ground, making maximum use of available cover and concealment, and several formations may be used. It is, however, one much used by a reinforced platoon in a mounted attack in open country:



And here is a good formation for a reinforced platoon in the assault with APCs (infantry dismounted): →

Now for some action SOP's. From an approach march formation, when contact is made:

- Plan A. Point forms base, main body of platoon flanks to right.
- B. Point forms base, main body flanks to left.
- C. Hold at position of (point) (main body), leading squad left, next right, 3rd left: light machine gun squad initially in reserve.*
- D. Hold at position of (point) (main body), leading squad right, next left, etc.

A word here. Your platoon is essentially a jabbing unit. Flanking movements with part of your force should be confined to short hooks well within supporting distance (400 yards).

A few last recommendations. In the approach march it often pays to put a man on the tank's .50 cal. machine gun. The extra fire power counts in that first fight for fire superiority. When you do hit something, get off the road, bring the enemy under fire, and REPORT.

In the attack ride your infantry as far as you can, but always dismount your infantry for the assault.

In the defense dismount at least your heavy 30's. Site

*Squad leader places his squad in a covered position, and reports to the platoon leader for orders.

all your weapons carefully, and clear your fields of fire. Make range cards for all guns and automatic weapons. Lay mines—as soon and as many as possible. Preplan your defense—defend the clock.

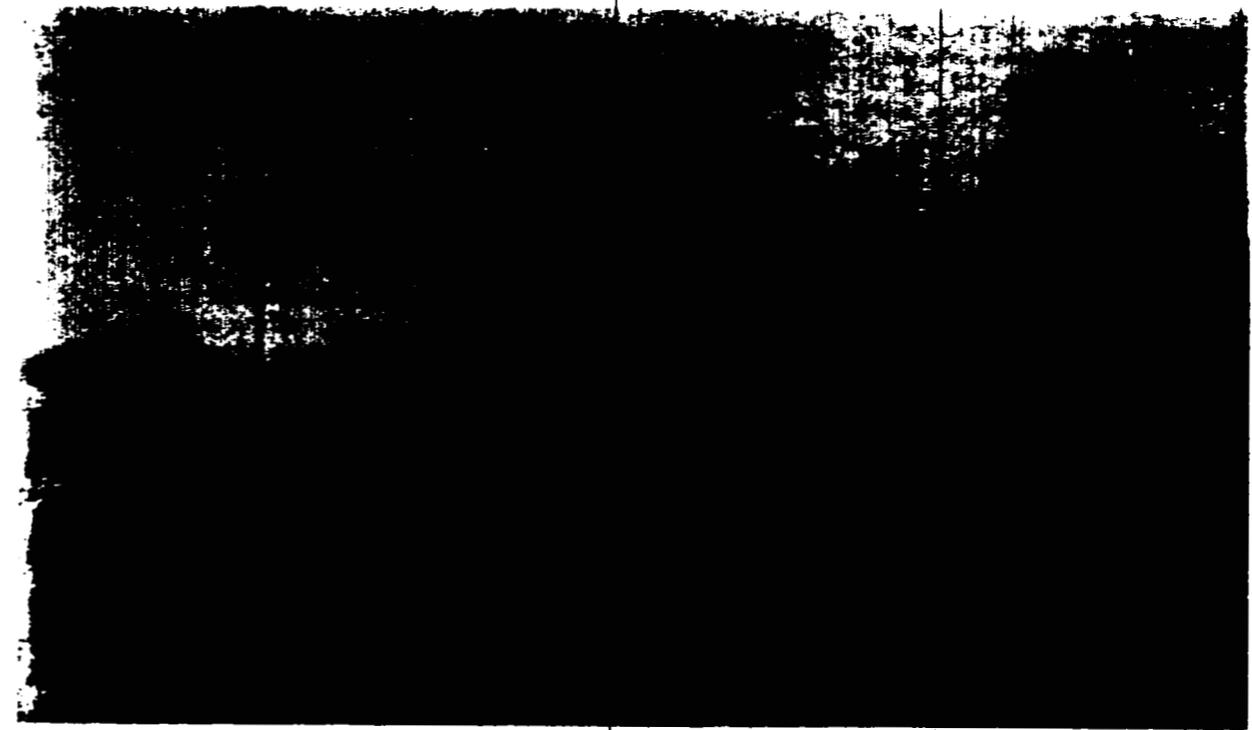
Any time, use your APC's. They may be used in sections to form or supplement your base of fire or to protect your flanks and rear. Put the tracks in hull defilade. Leave a gunner for the 50 cal. (as well as a driver). Put your platoon sergeant in charge.

You be with the decisive element (not necessarily the largest). The tank platoon leader is your expert in the use of tanks—use him as your second in command.

NEVER be caught with your fire power down. Our enemies specialize in the use of massed infantry. You must *always* be ready to stop whatever appears, dead in its tracks, and then destroy it.

A final word. This is just the beginning. These are suggestions based on experience. There will be those who disagree. You are going to have to learn those general rules—read the Field Manuals—and then decide on specific solutions to your problems. When you find a good one, if appropriate, make it SOP.

"All right, you know the situation. We'll try Plan A in my order, using that wooded draw there on the right. Be sure to keep those guns hot, and keep moving. On the objective, carriers cover from 4 to 8 o'clock; the rest of you act accordingly. Any questions? Let's go!"



The Tank-Infantry Team at Work

by LIEUTENANT THEODORE R. PICKETT, JR.

LIKE any team, the tank-infantry combination, for best results, requires mutual cooperation, confidence, training and hard work.

This article covers an eight-day period of combat in Korea and I think exemplifies the best use of the tank-infantry team in terrain such as that in Korea.

Our tank company was alerted to move to the support of the — Infantry Battalion in a series of limited objective attacks. We moved out with 13 tanks (M4A3E8's) and contacted the infantry at the assembly area (see map) at 1100, and were ordered to find a route to positions to support Item Company going up on Hill 339. The road had been cratered in five

Lt. Theodore R. Pickett, Jr., a Finance Corps Officer on a two-year troop duty tour with Armor, served with the Marine Corps during World War II as a pilot in VMB 443 in the Pacific. He joined the 72d Tank Battalion early in 1950 and has served with it in Korea as a combat tank platoon leader.

From the field in Korea a junior leader describes an operation involving tank-infantry teamwork; more of the moment-of-occurrence reporting so helpful in our training program.

places (air report received earlier) and therefore the tank platoon would have to follow the river bed. This was accomplished and the tanks were in position by 1400 hours. The AN-VRC3 radio had been netted with the infantry company commander and contact between him and the tank platoon leader was maintained through their march to and subsequent taking of the objective, Hill 339. General support fire was called for as the mortars and artillery were displacing, and the tank platoon (4 tanks) laid down the preparatory barrage and subsequent support. The hill was secured without enemy contact by 1630, and a perimeter set for the night.

Some minor difficulties were encountered. The tankers had no maps

available, the infantry and tank leaders had not met before starting off. A favorable factor was the lack of enemy contact. *It enabled the team to get acquainted!*

That evening, maps (1:50,000) were brought up and, at the suggestion of this platoon leader, targets were designated by number (i.e., hills, houses and road junctions were numbered 1 through 80 for quick target designation). The tank company commander had an SCR 508 radio and maintained contact with the infantry battalion commander, and targets were cleared through or called for by the tank company commander.

The morning of the second day the jump off time was set up one hour to 0700. As a result, the tankers missed

chow, an item corrected at succeeding mealtimes. The mission was to secure the pass between Hills 339 and 221 and exploit the valley to the north and west.

The engineers were ordered to precede the tanks down the road and clear it for them. The terrain of the pass made it mandatory that the tanks use the road. As the infantry held the high ground to the north (Hill 339) and was moving to the right there was no infantry down on the road. The road was cleared almost to the pass when the engineers found booby traps made with 60mm and 81mm mortar and 105mm howitzer rounds. Almost at the crest of the pass a wooden box mine was found on the left side of the road. An immediate search was conducted on the right side of the road for a sister mine but none could be found. The lead tank proceeded up the road. Upon reaching the spot where the mine had been found this tank hit a mine on the right side of the road. The crew immediately got out of the tank, something which should not be done if circumstances will permit remaining inside. Until the crew has ascertained whether the field is covered with enemy small arms and mortar fire, they should remain in their tank. In this case the infantry held the pass so it was of no serious consequence.

By the time the road was again open it was 1600 and the attack was halted with the infantry holding Hills 339 and 221. The tank company returned to a bivouac area at Takpokkol where they could perimeter and also support by fire the infantry battalion on the two hills.

The third day the plan called for a platoon of tanks to shove through the pass and hit designated targets while the right flank battalion moved up on line. This was done very nicely, much to the satisfaction of the division commander, who observed the operation. The tankers hit each target the first time (well trained gunners) and received many compliments on the excellent gunnery.

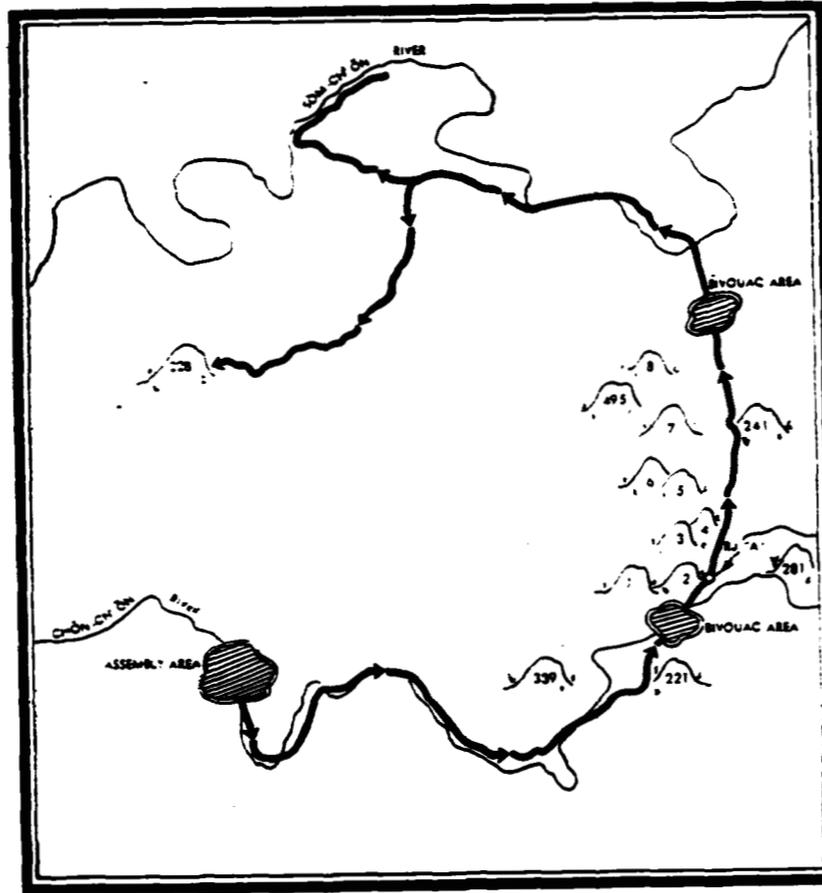
On the fourth day the right flank battalion was to seize Hill 281, and if possible the high ground to the north. The Infantry Battalion was to seize Hill 495 and hold. The AN-VRC3 radios were netted the evening before, and checked. The tank company was to advance by platoons, leapfrogging

down the valley, with the infantry following. An artillery and mortar preparation got under way at 0700 and the attack jumped off at 0800. The tanks progressed nicely, silencing some machine-gun nests, and secured the road junction ("A"). Four tanks were damaged by mines, even though they operated off the roads. One tank commander, who failed to follow his platoon leader's track across a road, hit a mine (even after he had been told to follow the tracks). The other tanks hit mines when they crossed the road. Every attempt is made to stay off the roads, even though the terrain is rough. That rough ride will keep more tanks and tankers rolling.

After securing the road junction, one platoon took blocking positions to the north, one to the northwest, and one to the west, along the three roads. At this time a platoon of the regimental tank company pulled in, and we had 17 tanks around the road junction, too many for adequate control, and the fact that they were from different organizations made control that much more difficult. To make the situation a little more fouled up,

we were trying to support the two infantry battalions, and there was not enough prior planning with the right flank battalion: initiative by the tank platoon leader produced contact with the right flank infantry battalion, and assisted the battalion to their objectives by close support direct fire.

The left flank infantry battalion found well-entrenched enemy on Hills 3 and 4, and requested one platoon of tanks to support their attack. One section of two tanks went into the cut between Hills 1 and 3, while the other two tanks went up the road north to outflank the enemy. The platoon leader remained at the junction for proper control of his platoon, and to insure that radio contact was maintained. The infantry company commander directed the tank fire via 300 radio and under its barrage started up on Hill 4, but the enemy hit them with quite a bit of fire, and they pulled back. Artillery was then called for and VT and WP pulled the enemy out of their holes. The three tanks then had quite a field day with approximately an enemy platoon routed and killed (either going up



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over 4 or coming off the reverse side). The infantry then secured the hill and the attack halted at 1730. The tanks were perimetered behind Hills 1 and 2 (south) for the night.

The fifth day was a slight repetition, as the infantry battalion was again ordered to secure Hill 495. With one company as a base of fire on Hill 6, and with the tank section of two tanks again in the draw behind Hill 3 where they could see Hill 495, and the other section and tank platoon up along the road to the right flank of Hill 495, the attack started with very close tank support, and progressed rapidly. One platoon leader did insist on fighting his own tank for a while (the platoon leader should bring the maximum amount of fire power to bear by using the whole platoon rather than by trying to do it all by himself). As soon as the lead company reached the peak the reserve company jumped through them to continue the attack. The infantry company commander of the lead company at this time turned the tanks over to the reserve company commander (via the 300-AN-VRC3 radios) for his support. It worked very smoothly and in conjunction with the mortars managed to send that enemy were alive scurrying off

to the north. As it was 1630 we dug in and held 495. The tanks withdrew to the positions held previously behind Hills 1 and 2 in the river bed to bivouac for the night. (Always pick positions back far enough, if possible, where you can support the infantry by fire. Prearranged range cards are of course a necessity and one of the first things we do each evening before dark is to make one for each tank.)

An afterthought on this day's work. We fired quite a bit of ammunition and almost constantly had two tanks at the river bed being re-ammored; we shuttled them so as to have constant fire power against the enemy. This could not be done by platoons, as we had only nine tanks, but it could easily have been done by platoons if more tanks had been available.

The sixth morning our objective was to secure the Somchon River ford and this was taken with little enemy resistance. The tank platoon leader, reaching the top of the pass between Hills 495 and 241, could see the enemy digging in on the hills above Muchon. He immediately called the infantry battalion commander on his AN-VRC3 and, giving the coordinates and the azimuth, brought artillery and mortars in on the positions and made corrections as

necessary.

The seventh day a patrol was sent to Hill 228 to contact the Marines, and a tank platoon, an infantry company and a squad from the regimental A and P platoon took this patrol. No enemy contact was made, but the demolitions team found booby-trapped mines (with 3 to 6 hand grenades) and double mines (one, and then another under the first, with a light dirt covering between the two).

By the eighth day another patrol of three tanks, an infantry company and the A and P squad went to Ford "E" to contact the Marines again. There were only three operational tanks by this time, due to constant usage with little maintenance.

The little time after chow was used to re-ammo and refuel and do some first echelon maintenance, but eight days is a little long for the best operation of the tank company. With only six hours of maintenance we had nine operational tanks once again.

In tank-infantry operations the pace of the attack is set by the tankers and tanks. The weapons and equipment must be used to full advantage.

Tankers must remember that they have the aggressive weapon and consequently must use that weapon aggressively.

Languages in Preparedness: Link or Obstacle?

In supporting America's role of world leadership the responsibilities of our Armed Forces hinge increasingly upon languages. A leading educator discusses our language problems and offers some solutions.

by L. E. DOSTERT

THE activation of an integrated international force on land, at sea, and in the air, under a supreme international commander, is without precedent in history. In the field of military planning, organization and operation, it constitutes a challenge to the ingenuity and creativeness of our own world's best military minds. The countries that are now united in the Atlantic Pact have readily made available to the supreme command some of their most competent men. These are being welded at the present time into an effective staff organization under the leadership of a proven Supreme Commander.

Oddly enough, when it comes to one of the basic requirements for the efficient functioning of the new forces—that of language—the thinking, planning and actions to date, in so far as they are known, have followed the pattern of World War II, if not indeed of World War I.—which is like saying that there is hardly any pattern at all. In this field much seems to be left to future improvisations.

In many areas of defense preparedness, including such relative newcomers as psychological warfare, for example, there is evidence of awareness and up-to-dateness, while in the case of the language problem—one which is certainly without precedent—the pattern of action seems to be marked with an obsolescent approach. This writer believes that unless the problem of multilingualism inherent in the creation of an integrated inter-

national force is recognized, properly defined and analyzed, and practical action taken to meet it squarely, we shall fall way short of our potential effectiveness in this important field.



L. E. Dostert has had extensive experience in the language field, both as a civilian educator and as a military officer. From 1926 to 1941 he served on the faculty of Georgetown University. Following a tour in 1942 with the O.S.S., he entered upon active duty with the U. S. Army for a four-year period in which he rose from major to colonel, filling such key posts as liaison officer to General Giraud; interpreter to General Eisenhower; and Chief of the Language Division of the Nuremberg Trials. In 1946-47 Mr. Dostert served as director of the Simultaneous Interpretation Division of the United Nations; in 1948-49 as administrative counselor to the International Telecommunication Union at Geneva, Switzerland, and also as secretary general of the International High Frequency Broadcast Conference. Since 1949 he has been director of Georgetown University's Institute of Languages and Linguistics.

Coordinated military action rests basically on the accurate formulation, transmission and reception of ideas, and language is the normal vehicle for the communication of ideas. Unless timely measures are taken to insure that language does remain an effective means for the communication of ideas—a link rather than a barrier—then many a phase of the activities of the Atlantic Pact forces will labor under serious handicap. Nor is it an answer to point to the fact that so far, during the early planning phases, there have been no serious language difficulties. The tasks ahead, in this area as in many others, are much more arduous than the encouraging but still inchoate accomplishments of the early months.

It is probably unfortunate that language, like religion and politics, is a subject about which nearly everyone considers himself endowed with certain innate wisdom and competence. It would be belaboring the point to insist that as a people we Americans have been largely unaware of the importance and value of skill in foreign languages. Even in those areas, both military and civilian, where language proficiency is important, our record is not particularly brilliant. A native American really skilled in the use of a foreign idiom is still a rarity. This ingrained attitude probably accounts for the casualness with which the complex problem of language in the NATO has so far been regarded.

But the heavy hand of the past

weighs in other ways. Heretofore, military forces of different nationalities, united in a common objective, were only coalitions of independent and self-contained national contingents. A "liaison" at the top level in World War I was really the only measure of integration achieved—and even then only two languages were involved: English and French. In World War II, the only true integration achieved at the staff and field levels was between the Americans and the British—with no language problem, except perhaps now and then in peculiar semantic idiosyncrasies at staff level. The forces that were later placed under a single command in the Mediterranean area in particular were of several idioms and nationalities: American, British, French, Polish, Yugoslav, Italian, South African, Palestinian—but except for the Americans and British, they were not military forces of recognized and co-equal sovereign governments,—they were the salvaged and brave fighting legions of countries under the yoke of the enemy. The Brazilian forces did not fall into this pattern, and the language problem they created was a source of complications.

This time we are not dealing with the forces of occupied allied or friendly countries, but rather with the freely contributed contingents of co-equal sovereign governments. Their languages, so far, are English, French, Dutch, Danish, Norwegian, Italian,



Gen. Eisenhower confers with the Standing Group, North Atlantic Treaty. NATO now has twelve nations posing a language problem at all levels.

"Other reforms in the Assembly's procedure are recommended . . . it is essential that the system of simultaneous translation which was used successfully in one committee room during the past session, be extended for use in all plenary sessions and in committees. It will be difficult, not merely because of the expense, but because personnel with the necessary experience are hard to find, but they must be found."—Paul-Henri Spaak, President of the United Nations General Assembly 1946-47.

Portuguese, possibly Icelandic. It is conceivable that Turkish, Greek, German, Serbo-Croatian and Spanish may later be added to the list.

There does exist one rather arbitrary way of attempting to solve the problem of multilingualism in an integrated international force: it is to decree purely and simply that English and French are to be accepted as the "working" languages for all purposes. Let everyone come prepared to use these "international" tongues. So far these two languages have been the working languages of NATO. This simple, though arbitrary, solution has been tried before and found wanting, if only in the case of the old League of Nations, and during the early period of the United Nations. In effect, this solution in regard to NATO amounts to relegating the non-French or non-English speaking countries to the status of linguistic satellites.

Even if the deep psychological disadvantages flowing from such an arbitrary procedure are overlooked there is still a graver difficulty. The two-language solution would in effect subordinate technical competence to language skill. Assume, by way of example, that a meeting is called between the Surgeons General of the integrated forces to examine a common problem. If French and English are imposed as the only languages of the meeting, it might well mean that subordinates would be designated as representatives *ad referendum* for sex-



Language problems are increasing as nations of the world are in closer contact. Here Turkish infantrymen are teamed with U.S. tankers in U.N. action in Korea.

eral countries. What this entails is quite obvious. And this situation might well exist in many other fields where adequate coordination, if not complete integration, is called for.

The language problem will have to be resolved at the staff, field and troop levels, both for the spoken and written forms. Obviously, the extent of the difficulties will vary in accordance to the requirements of specific fields and different levels. In any case, one cannot avoid the recognition of the magnitude of the problem and of the necessity of taking reasoned and timely steps to insure a practical solution. This means that a solid and effective training program with pre-

"I could cite many . . . cases in the United States Supreme Court—that have taken . . . much longer to try [than the Nuremberg cases]."

"In this connection it should be noted that we decided to install facilities for simultaneous interpretation of the proceedings into four languages. This was done against the advice of professional interpreters of the old school that it 'would not work.' It does work and without it the trial could not have been accomplished in this time if at all. To have had three successive translations of each question, and then three of each answer, and to have had each speech redelivered three times in different languages after the first delivery finished, would have been an intolerable waste of time. The system we used makes one almost unaware of the language barrier, so rapidly is every word made available in each language."—Excerpt from the Text of Justice Jackson's Report to the President on the Nuremberg Trial.

cise objectives should be instituted and carried out competently.

Let us look for a moment at the needs in respect to spoken language. On two occasions in the recent past a similar problem was solved in a relatively simple and practical way. When, in keeping with our proclaimed war aims, the Nazi war criminals were to be tried in Nuremberg, the language question came up. The directives stated plainly that the trials must be conducted expeditiously, and at the same time that all parties to the proceedings, i.e., the Bench and the Prosecution (English, French, Rus-

sian), and the Defense (German), were to have complete equality of access to the proceedings, whether in respect to the spoken language or to the documentation. To conduct a trial as complex and historically significant in four languages did constitute a challenge. An answer was found, and the same method was later to be used in the United Nations and many international conferences: that is, simultaneous interpretation. Elsewhere in these pages the words of Justice Jackson's report to President Truman are quoted in regard to the effectiveness of the solution.

The same routine-like approach now prevailing in respect to the military language problem was an obstacle to even the experimental use of the system at the United Nations. Today it is not an exaggeration to state that the United Nations' business, independently of any other considerations, would be greatly handicapped were it to return to the system used in 1945-46, and which is precisely that which is now in use in the NATO.

Here again it is perhaps best to refer the reader to the opinions of the users of the system rather than to the views of its advocate in respect to its effectiveness. The reader will find on these pages the text of a recommendation by the Secretary-General of the United Nations for speeding up the work of the organization, and also the words of one of the former presidents of the United Nations General Assembly, Belgian ex-Premier Paul Henri Spaak.

Many other references could be cited concerning the effectiveness of these modern techniques in solving the problem of multilingualism in international life, both in respect to the spoken form of the language and to documents. The cases referred to are sufficiently eloquent to dispense with this.

It is quite conceivable that with energetic and imaginative action, taken in time, the problem of language in an integrated force using eight, ten, or twelve languages, far from remaining a barrier could in fact become a link. It takes no great imagination to conceive a situation in which ten languages are used on a basis of complete equality, and in which the deliberations would be conducted with the ease and effectiveness of a monolingual conference.

Here again, the practical and psychological advantages are obvious.

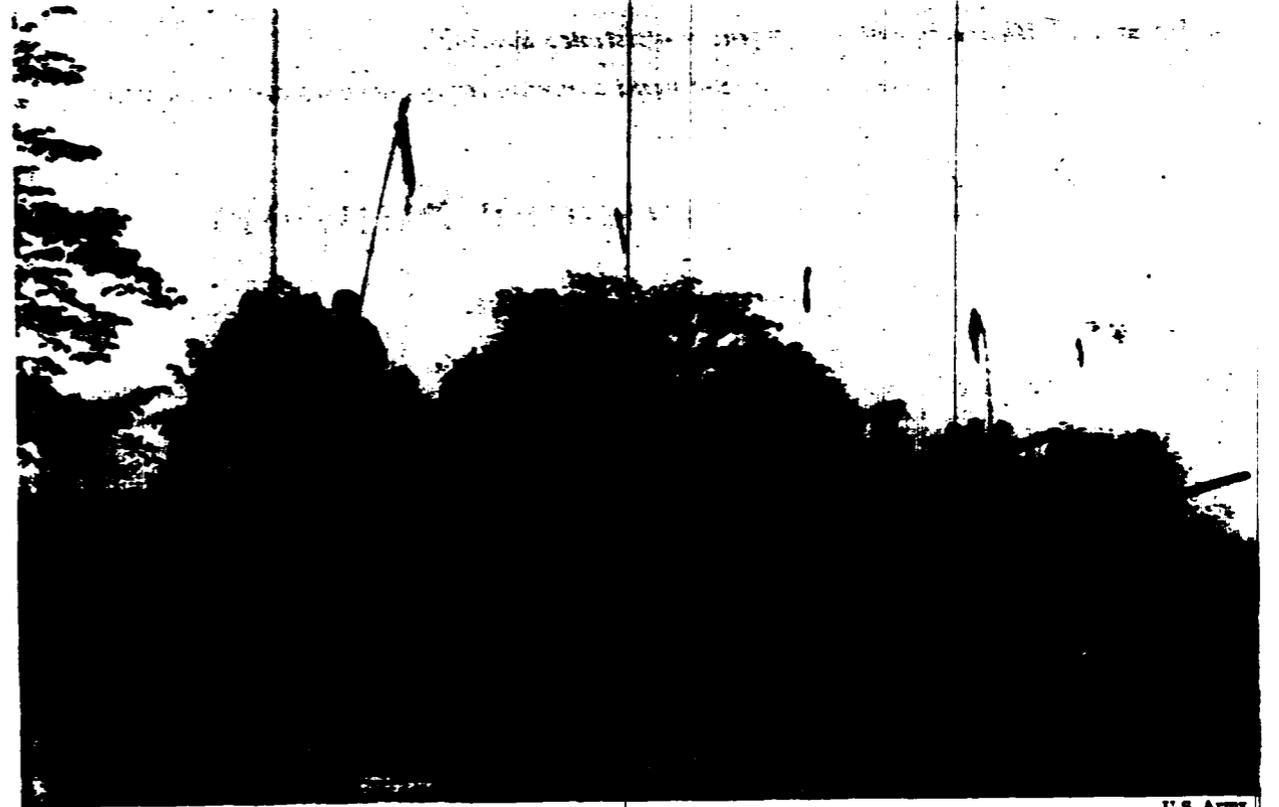
What is needed is in fact very little: a study of the anticipated language requirements, the planning of a training program designed to meet the language needs for oral interpretation at formal meetings or other levels, as well as the processing of documents in various languages; the recruiting of qualified military and civilian personnel for specialized training from the various member countries (and let no shibboleth of proportional national representation take precedence over good results); the creation of a training center adequately staffed—and the language problem is on the way to a solution.

"The immense volume of work which seems likely to face the General Assembly year by year renders it necessary to consider carefully possible measures by which that work may be accomplished as expeditiously as possible. The problem is not merely how to economize time . . . but to be in a position to take final action . . . and thus avoid the cumulative effect of postponement of idioms to later sessions.

"Should the system of simultaneous interpretation be found satisfactory by the General Assembly, it is suggested that the facilities should be extended so that this form of interpretation may be used for the general debates at plenary meetings and for general debates in all main committees." —Trygve Lie, Secretary General United Nations.

Nor should the importance of a simple language program at the troop level be overlooked. There is no barrier so great among men as that of silence. There is no handicap so great to effective effort as misconception and misunderstanding. There is no boon so strong for morale as ability to communicate. This applies not only to staff and field operations. It applies also to troops of various nationalities located in a given sector, as well as to the relationships of troops speaking one idiom with the population of a friendly area speaking another language.

In this field, as in many others, adequate steps taken in time can well transform a handicap into an asset.



U.S.M.A. Cadets Taking Instruction in Armor. Tanks are numbered from left to right—Cadets are listed from left to right on each tank: U.S. Army

Tank Number 1
Phillips, C. D.
Schwarz, R. A.
Allen, R. C.
Brown, N. J.
Dorton, J. J.

Tank Number 4
Irving, F. F.
Haumerson, J. P.
Clarke, J. W.
Duke, I. E.
Ashley, F. L.
Fleming, J. V.

Tank Number 2
Steiger, W. C.
Woodley, T. R.
Orlikoff, E.
Ritter, J. J.
Hilty, P. R.
Winner, F. L.

Tank Number 5
Janssen, R. P.
Check, J. A.
Charney, T. J.
Buckstead, J. W.
Tausch, R. D.

Tank Number 3
McLean, R. P.
Robertson, B. H.
Sheridan, S. R.
Phillips, J. H.
Vetort, H. J.
Martin, L. B.

Not Present
Lynch, P. H.
Horgan, T. B.
Byers, J. R.
Beczakiewicz, P. A.
Knapp, H. J.
Brett, J. S.
Foster, T. G.
Tague, D. R.

West Point: Class of 1951 Armor Graduates

Of the 475 Cadets who will be graduated from the Military Academy in June, 36 have selected Armor as their basic branch. Department of the Army policy this year has prescribed that the graduates who select the field forces be commissioned initially in a combat arms branch.

Lieut. Colonel Andrew R. Cheek, of the Armor Section, Combat Arms Detachment, 1802nd Special Regiment at West Point, is charged with the training in armor presented to the Cadets. He is pres-

ently conducting a special course for those Cadets who have selected this branch for their commissioned service. The following is a breakdown of the branches which the Cadets have chosen and the number being commissioned in each case:

Air Force	119	Engineers	50
Infantry	156	Armor	36
Artillery 53 (FA)	36 (AAA)	Signal Corps	25

These are the only branches which it was possible for the Cadets to choose.

*A practical illustration of the engineer assistance available
to the combat command commander in carrying out his mission.*

CCB Gets Engineer Support

by MAJOR JOHN W. BARNES

COLONEL C. C. BAKER began to pace back and forth beside the field table on which were laid several map sheets.

"Major Three!" he bellowed. "Yes, sir!" Major S. Three's prompt response preceded him as he dove into Colonel Baker's blacked-out tent.

"As you know," said the colonel, "we're jumping off day after tomorrow. This combat command has the mission of penetrating the enemy defenses in the vicinity of Leesboro and Effietown, seizing the important road junction at Ednieville, and continuing on over the West River near Steeleton. Our objective, seventy miles from here, is the high ground west of Hewittsburg, which we are to seize and hold until Corps can launch a coordinated attack on Hewittsburg. We've finally contained the Aggressor forces. Capturing his major supply center of Hewittsburg should prove his downfall, at least in this area. Kind of a rough assignment for a new combat command commander who hasn't been with the outfit a whole day yet."

"Yes, sir. Have you gone over the plans yet?"

"Yes. They look pretty good. But I'm worried about all those obstacles we've got to get through before we hit the wide open spaces beyond Ednieville. And if the enemy blows the Steeleton bridge over the West River, we'll be in for a lot more trouble. Who's the engineer expert on this staff, Three?"

"Captain Castle, sir. He commands Company A of the armored engineer battalion. His company is attached to us for this operation."

"He's a company commander? You mean to tell me he's a staff man, too?"

"Yes, sir. That's the way the engineers operate. The senior engineer officer attached to the combat command not only commands all the engi-

neers; he's the combat command staff engineer, too. Usually we get only one armored engineer company and a bridge platoon from the engineer battalion's bridge company. That means the company commander really has his hands full. He's got both staff and command responsibilities."



Major John W. Barnes is a 1942 graduate of the Military Academy. During World War II he served as company commander and held several staff positions in the 51st Engineer Combat Battalion in the ETO. After the war he received his Master's Degree at Cal Tech, served as Chief of the Demolitions Branch at the Engineer Research and Development Laboratories, attended the Engineer Officers Advanced Course, and commanded the Engineer Test Detachment at Fort Churchill, Manitoba, Canada. He is presently an engineer instructor at The Armored School.

"What happens when we have more engineers attached?"

"Well, sir, the armored engineer battalion sends us one of their majors, either the exec or the S-3, to be our staff engineer. That leaves the engineer company commanders free to supervise all the engineer work we need done. We don't get a major, though, unless there's an awful lot of engineer work anticipated, or unless we get two or more engineer com-

panies attached."

"Where is Captain Castle now?"

"I can get him right away, sir. His company has just closed in its assembly area."

"Send for him. And tell him to wear his staff hat."

"Yes, sir." Major Three saluted and left.

Colonel Baker reviewed the plans that Three had prepared. The combat command would initially attack with battalions abreast, using the Leesboro-Effietown road as the line of departure. Boundaries for the attack would be the line Leesboro-Ednieville, both inclusive, on the north, and Effietown-swamp on the south. Boundary between battalions would be the south fringe of the forest between Leesboro and Ednieville. 101st Armored Infantry Battalion (reinforced) to attack through the forest toward RJ 468. 11th Medium Tank Battalion (reinforced) to attack east on the Effietown-Ednieville road. Upon seizure of RJ 468, the attack to change to column of battalions, 11th Medium Tank Battalion (reinforced) leading.

Not the most ideal terrain for armor, Colonel Baker thought. What beautiful sites for enemy obstacles...

"Sir, Captain Castle reports as ordered." Colonel Baker looked up to see the engineer captain standing at the entrance to the tent.

"Glad to see you, Castle. I was just worrying about obstacles. Are you acquainted with the plan for our next operation?"

"Yes, sir. Major Three went over it for me on the way here."

"Good. Now, let me see. You have three platoons in your company, plus a bridge platoon from battalion. Right?"

"Right, sir. And each of my platoons has three squads."

"Well, Castle, suppose we attach a

platoon to each attacking battalion. Then they'll each..."

"Begging your pardon, sir," Castle interrupted, "but I believe it would be better to place those platoons in close support. Attaching an engineer platoon to a reinforced battalion is placing an unnecessary administrative burden on the battalion commander. I can easily control and support those platoons, and they'll do the same job whether they're attached or in support. We believe it's best to attach engineers to supported units only when the situation is such that the parent engineer unit cannot provide effective operational control and logistical support."

"Good enough. But I'm relying on you for adequate engineer support for my attacking battalions. Now, between here and Ednieville we have quite a defile to attack through. Chances are there'll be a mine field or two, and I don't expect we'll find the bridge near RJ 468 in very good shape. Looks like a lot of engineer work. Think I should ask for one of the other three companies in the armored engineer battalion?"

"No, sir. Each of my platoons can gap the mine fields for the battalion it supports. I'll still have enough engineers left to widen the gaps to permit more rapid passage for the remainder of the combat command."

"As far as the bridge is concerned, if leading elements of the 11th can't find a ford, my engineer platoon supporting it will be able to put across a bridge without too much trouble. You see, sir, I'll send a fixed bridge section, of which there are two in the bridge platoon, along with that engineer platoon. The fixed bridge section has three bridge trucks and a bolster truck. Each bridge truck carries 24 feet of bridge, and the bolster truck carries two intermediate supports. If the crossing is wider than 34 feet, which is the longest span of bridge that will support the medium tanks, they'll use one or two intermediate supports to construct a fixed bridge up to 72 feet in length."

"If you have a chance, sir, perhaps you can advise Lieutenant Colonel Tank of the 11th to have his supporting engineers near the head of his column, maybe even behind his leading reinforced company. If he finds the bridge out, he won't want to waste time waiting for the bridge trucks to

double his column, especially since the road is narrow and in a defile."

"Right, Castle. Thanks for the hint. That takes us up to RJ 468. Now," Colonel Baker continued, "our air force people have been shooting up enemy troop and supply columns between RJ 468 and Ednieville. That stretch of road will probably be cluttered up with disabled vehicles. What have you got to help the 11th out when it starts to lead the combat command in column beyond RJ 468?"

"My supporting engineer platoon has a tank dozer, Colonel, and each medium tank company in the 11th has two of them. I'm sure they'll all be able to take care of removing disabled enemy vehicles from the road, under fire, if necessary."

"Well, I'm glad to hear each engineer platoon has a tank dozer. That makes a total of twelve in the armored engineer battalion. I transferred to armor back in '47, Castle, but I haven't been with troops since. When I had my regiment, there was a change in the mill to give the infantry division's engineer battalion five of those tank dozers. They were all to be pooled in one platoon in the engineer H&S Company. While we're on the subject, are there any other major differences between the armored engineer battalion and the battalion with the infantry division?"

"Yes, sir. The bridge company of the armored engineer battalion has two bridge platoons. In the infantry division there is only one of these

bridge platoons, and it is an organic part of the H&S Company. The platoon itself, however, is identical to the bridge platoon we have in the armored division. So you see, sir, there are two basic differences in the organization—concerning the tank dozers and the bridge platoons.

"There are also two basic differences in employment. First, as an infantry regimental commander, you probably hardly ever had engineers attached to you, unless you were operating on a separate task force basis. As a combat command commander you will find that your supporting engineers are almost always attached, except when the whole armored division is employed on a defensive mission. In the defense, the engineer effort is normally integrated under the supervision of the division engineer, who is also, as you know, the armored engineer battalion commander.

"Second, as an infantry regimental commander, you probably always had the same engineer company supporting you. Now, as a combat command commander, you can expect any of the armored engineer battalion's four companies to be attached to you. The reason for it is this. If each combat command always had the same engineer company attached to it, only two of the engineer companies would be used in the normal supporting engineer role, there being only two combat commands. And these two engineer companies would be called on continually to do most of the great



amount of engineer work necessary to keep armor rolling."

"Very good, Castle. Now, let's get back to the operation at hand. I expect that critical intersection in Ednieville will be a shambles by the time the 11th gets there, what with our air force pounding it and the enemy messing it up too. But those tank dozers'll take care of it, won't they?"

"No, sir. I don't believe so. Filling large craters and removing large amounts of rubble is too difficult a job for the tank dozers to handle. But in my company headquarters I have a D7 angledozer which is ideal for a big job like that. As soon as it's needed, I'll have it taken to Ednieville on its special 20-ton trailer. It will clear that intersection in jig time."

"The last obstacle I can foresee before we get into that good tank country the other side of Ednieville is that Ednieville bridge. Will we have enough treadway bridging to take care of that crossing?" asked Colonel Baker.

"Yes, sir. We'll have plenty to take care of it. But if we're lucky, maybe the enemy won't be able to demolish that bridge completely. If they just damage it, we'll be able to repair it, and thus save as much of our treadway equipment as possible. We might need all of that treadway we have, and more, when we get to the West River."

"I don't want to waste any time in Ednieville, Castle. How fast can your engineers repair a bridge? And where will you get the construction materials you'll need?"

"If we can get the materials, Colonel, we can repair any damage to the superstructure in a couple of hours, at least enough to get traffic rolling on it. I have a motorized air compressor in company headquarters that's a great labor-saving device when it comes to fixing bridges. It has saws, hammers, and drills, all operated by air. And each of my platoons has a gasoline power chain saw that is a big help in cutting bridge timbers to size."

"As far as the materials are concerned, there should be plenty in Ednieville: such things as floorbeams used in buildings. There might even be a sawmill or lumber yard in a town that size."

"Well, go ahead and plan to repair the bridge, Castle, but if it looks like it's going to be a time-consuming task,

don't hesitate to use the treadway equipment."

"Right, sir."

"Once we get on to Trafficability Pike, we should have clear sailing until we get to the West River. With luck, the 11th might capture that bridge intact. But we've got to be prepared for the worst. If we lose that bridge, Castle, what can you do about it?"

"I have one bridge platoon, Colonel. That gives us 288 feet of floating bridge, less whatever treads we use up on the way. We'll need more bridging from my battalion if we're to put across a floating bridge. I understand the river is nearly 250 feet wide at Steeletion. Could you request the whole bridge company for this operation? That would give us two bridge platoons, and we're likely to need them, especially if we lose any equipment in the crossing."

"I'll put in a request for it, Castle. But if we get to the West River before the remainder of the bridge company catches up to us, what can we do about it?"

"We can't do much at all against a determined enemy, Colonel. But if our crossing is unopposed, we should get a bridgehead on the other side without too much trouble. It'll be touch and go, and until we get some tanks across to support the infantry, we'll be especially vulnerable to counterattack. With little or no enemy opposition to the crossing, we can get armored infantry across in the 21 assault boats organic to the bridge platoon. As soon as possible, we'll start ferrying tanks across on the treadway rafts. These rafts can be used later on as part of the bridge itself."

"Better figure on a hasty crossing, then, Castle. I doubt if the enemy'll show much opposition. By the time we get to the West River, we'll have Aggressor on the run. As soon as we clear Ednieville, have two of your platoons and the bridge platoon march in column immediately behind the 11th Medium Tank Battalion. The 11th will still have its engineer platoon in close support, so all the engineers except your headquarters personnel will be well forward in the column."

"I'm glad you brought that up, sir. Usually, I have a rough time trying to sell commanders on having their engineers well forward in their ex-

plotting column. They don't seem to realize that obstacles are encountered by the head of the column, and that it's money in the bank to have the engineers close at hand to overcome the obstacles. Most commanders think engineer vehicles, especially bridge trucks, are too slow and cumbersome. But on a road they have no difficulty keeping up with tanks."

"By the way, Castle, how many trucks are there in the bridge platoon?"

"Twenty-five, sir. One jeep, one 3-ton, three 2½-ton, 18 bridge trucks and two bolster trucks."

"And how about your platoons?"

"Each platoon has a jeep, a tank dozer, two 2½-ton, and three armored personnel carriers."

"That doesn't sound very cumbersome. And if the enemy blows that bridge, we're going to need engineer equipment for the crossing as soon as possible. During the initial crossing phases, before we can build up in strength on the far bank, I'll mass all the fire I can get on the near bank to give the infantry and engineers maximum protection."

"As soon as we seize that high ground west of Hewittsburg, Castle, we'll have to take up the mobile defense until we get enough people and supplies to launch an all-out attack on Hewittsburg. Any ideas on organizing that hill for defense?"

"Well, Colonel, from the map it looks like that secondary road across the top of the hill should have some likely spots for road craters and abatis. We can also . . ."

"Hold your fire, Castle. What's an abatis?"

"Oh, sorry, sir. An abatis is an obstacle made by felling trees across a road. The most effective abatis is one with antitank and antipersonnel mines strewn through it. Makes it a messy operation for the enemy to breach it."

"Roger. Now what else can you do up there on that hill?"

"We can lay a mine field or two across the main Hewittsburg-Steeletion road. Doesn't look like there are many natural obstacles to tie them into, but as long as they are covered well by fire, the mine fields will be pretty effective as obstacles to enemy advance. And, of course, I'll keep my angledozer busy digging hull-defilade positions for tanks, if there aren't more

urgent tasks for it to do."

"One thing you didn't mention, Castle. If the going gets rough on that hill, I'll probably call on you to perform as infantry. Your people are trained for that, aren't they?"

"Yes, sir. But I hope you won't use us as infantry unless there's no other way out. You see, sir, engineers are trained specialists and are very hard to replace. It takes many months to train an engineer unit, and it's almost always more economical in the long run to assign only engineer tasks to the engineers supporting you. However, if you *have* to use your engineers as infantry, Colonel Baker, it would be well to remember that they can't be assigned frontages as wide as those assigned infantry units comparable in size. The engineer company reorganized for combat as infantry has far fewer personnel and less fire power than the infantry company."

"I'll remember that, Castle." Colonel Baker thought a moment. "Well, that about covers everything. You've relieved my worries about overcoming all the obstacles I'm expecting the enemy to throw in our way. I didn't realize that an armored engineer company and a bridge platoon had so many capabilities. Doesn't look like we'll need any extra engineers from your battalion, except that other bridge platoon. Guess we'll be keeping you pretty busy, won't we?"

"Yes, sir. And we'll be doing a couple of other things for you as we go along. I have a water supply section attached to me from our H&S Company, and we'll be supplying all your people with water during the entire operation. Also, we'll be conducting engineer reconnaissance. That's a continuing function with all engineer troops. We're always on the lookout for engineer materials, and we report all items of engineer interest back through our own channels."

"As an example, I intend to send a party into that quarry west of Steeletion to see if there's anything we can use. We may find some rock stockpiled there that might come in handy for building approaches to a floating bridge over the West River."

"All in all, Colonel, we'll be discharging all our responsibilities in this operation: stream crossing, road opening, obstacle removal, defensive works, engineer intelligence, and engineer supply."



Maj. Gen. William M. Grimes, who died on 2 April at San Antonio, Texas. General Grimes was commissioned in Cavalry in 1911. Following Cavalry assignments in the States and the Philippines, he went overseas in early 1918 to join the 13th Machine Gun Battalion, with which he saw action in the Anauld and St. Die sectors and the St. Mihiel and Meuse-Argonne offensives. Back in the States he taught at the Infantry and Cavalry Schools and served in troop and staff positions as well as attending leading service schools. In 1940 General Grimes was assigned to the 1st Armored Regiment at Fort Knox, and in 1941 to the 4th Armored Division at Pine Camp, N. Y. In the spring of 1942 he became CG of the 8th Armored Division at Knox. Prior to retirement he was in command of the Cavalry School. Burial was at Ft. Sam Houston.



Maj. Gen. Hugh T. Hoffman, who died on 2 April while undergoing a serious operation. General Hoffman was a graduate of the Military Academy, Class of 1918. In 1919 he made a tour of the European battle fronts, following which he returned to the States for assignments in troop duty with various Cavalry units, and as student at service schools. In early 1942 he assumed command of the 5th Cavalry Regiment, took it to Australia in 1943 and led it through the New Guinea and Admiralty Campaigns. In August of 1944 he took command of the Second Cavalry Brigade for the Leyte-Samar Campaigns and the dash to Manila. Following a period in command of the First Cavalry Division, General Hoffman resumed command of the Second Brigade for the occupation tour in Japan, returning to the States in 1949 to become Chief of Staff of the Fourth Army.

Lt. Gen. James A. Van Fleet, assigned recently to command of the Eighth Army in Korea. General Van Fleet is a 1915 graduate of the Military Academy. Commissioned in Infantry, he served overseas in World War I, and was wounded while commanding the 17th Machine Gun Battalion. Between the wars he served career officer tours in troop and staff duty and as service school and ROTC instructor. In mid-1941 he assumed command of the 8th Infantry Regiment, which he later led onto the Normandy Beaches with the 4th Division. He later commanded the 4th and 98th Divisions and III Corps in the ETO Campaign. In the postwar period he was director of the Joint U.S. Military Advisory and Planning Group in Greece, next commanding Second Army before assuming command in Korea.



Maj. Gen. William C. Chase, just assigned to command the U. S. Military Advisory Group to the Chinese Nationalist Government on Formosa. General Chase was commissioned in Cavalry in 1916, and following several assignments with troops in the States, went on to France for service with the 11th Machine Gun Battalion in the Aisne-Marne, St. Mihiel and Meuse-Argonne offensives. Following the war he served regular career assignments in troop, staff and instructional duties, and as student at top service schools. In command of the First Cavalry Brigade he led the force that landed on Los Negros Island in the Admiralties, later took his brigade into Leyte and Luzon, and led the Flying Squadrons into Manila. From 1945 to 1949 he was CG of First Cav Div in Japan, then C of S, Third Army.



1 ne Mothballed Tanks
BERLIN.—This strange city is an island of freedom amid the surrounding slavery of the Soviet zone of Germany. It is a town where millions of simple people bravely carry on in the present shadow of danger. It has several other personalities and aspects. But for the most part, Berlin is, above all, a city in the Iron Curtain, a city which must be seen as not visible from Washington or Paris or London. Perhaps the best symbol of this thing one sees through this city is a moth-balled tank. Rather recently, a large fact of Western observers had been encouraged by the belief that the Soviets possessed no armor west of the Visula. True, there were at

New U. S. Tanks Pack Speed, Hitting
Newest Tank Model Due Off Line Today
By Nelson Merin
 Associated Press Special Correspondent
 In Italy during the last war I was asked to question a German officer, who said: "The German Army is not slow, much slower than you think it is. It is relatively early in the time later, a German tank is the last of a four-part series of the United States military analyst, speaking to Berlin. told his listeners: "The enemy has only one principle—the principles of the tank. He understands mo-

GEN. COLLINS BACKS ARMY GROWTH RATE
Views Faster Call as Waste of Manpower—Hails Record of Our Medium Tank
By AUSTIN STEVENS
 Special to The New York Times
 WASHINGTON, Feb. 13 (AP).—Gen. J. Lawton Collins, Army Staff, defended today the Army's medium tank and declared that with a half full mobilization it could be met. The Army chief of staff, Gen. Omar Bradley, said that a more rapid mobilization would be a waste of power. A more rapid mobilization would be a waste of power.

Chrysler Told To Set Up Tank Motors Plant
Army Receives 'Best Light Tank in the World'
As Production of 'Walker Bulldog' Is Started
CLEVELAND, March 27.—The Army here today by the Cadillac division of the General Motors Corporation. The new tank that meets the performance standards laid down after World War II by the Army Equipment Board was delivered to the Army here today by the Cadillac division of the General Motors Corporation. The new tank that meets the performance standards laid down after World War II by the Army Equipment Board was delivered to the Army here today by the Cadillac division of the General Motors Corporation.

SOME NOTES ON ARMOR

The Army has just announced that the famous 2d Armored "Hell On Wheels" Division has been alerted for overseas movement to Europe, where they will become a part of Gen. Eisenhower's North Atlantic Pact forces. They join hands with the U. S. Constabulary, which comprises the rough equivalent of an armored division: the French 5th Armored Division; and the British 7th and 11th Armored Divisions, plus one armored brigade: this will lend backbone to the regional defense forces in Western Europe.

Cold rubber, which has high resistance to abrasion, will be used in the production of a \$9,000,000 order of replacement tracks for U. S. Army tanks, it was recently announced by the B. F. Goodrich Company. Its application is expected to increase the limited life of tank tracks. This tough American rubber, which Goodrich discovered early in 1941, now is used in all passenger tire treads with a resultant 15 to 25 per cent increase in mileage. Cold rubber also is used in the manufacture of some conveyor belts.

In addition to the replacement tracks for Sherman, Pershing and Patton tanks, the company is producing cold rubber tracks for high speed cargo carriers and motorized gun carriages.

Lt. Gen. Willis D. Crittenger, Commanding General of First Army and President of the U. S. Armor Association, speaking at a luncheon in New York City recently, had this to say: "Since war is a national effort, we Americans must capitalize on our industrial advantage in the fields of manufacturing, assembly lines and production capacity. Since it is in this technological sphere that we stand unchallenged, it is on this level that we should meet the enemy—a level where the advantages are ours. That is why we are so intent in training our American soldier up to his responsibilities in the utilization of these great technological advantages which are his. All of which is another way of saying that the American Army is just as good as the individual man who makes it up—no better and no worse."

The British have announced that production of the Centurion tank is being rapidly increased. Production of

a new and even more formidable tank is also being increased. In addition, a comprehensive range of new anti-tank weapons is being developed, including recoilless guns, while other weapons are being modified.

"The T-41 Walker Bulldog is the first completely new tank to be built by the Army since World War II," said Secretary of the Army Frank Pace recently, marking the occasion of the first production model to roll off the assembly line at the Cleveland Tank Plant of Cadillac. "It is a fast, maneuverable vehicle, classed as light because of its 26-ton over-all weight, and its cavalry and reconnaissance mission. Its punch is in a new high muzzle velocity 76mm gun. On the basis of present knowledge we think it will outfight, outgun and outmaneuver anything of its class in the world, and its armor provides maximum crew protection for vehicles of this class."

And Under Secretary of the Army Archibald Alexander, speaking at the Cleveland plant at the ceremonies marking the delivery of the first tank three months ahead of schedule: "there are certain conclusions to be drawn

from this event today... first... we do have an excellent new light tank... Second is the fact that our country has been able to get these into production in such a short time. Third, and most important is the fact that both the resolution to have this new tank and the ability to produce it indicate the frame of mind of this country."

On May 4th the 6th Armored Cavalry Regiment celebrated its 90th birthday as it carried along its years of service with its current assignment as a part of our occupation forces in Germany. Formed in 1861, the 6th boasts a record of thirty-two major campaigns and service in a dozen foreign countries.

Another unit celebrating its birthday is the famous 3d Cavalry, now designated the 3d Armored Cavalry Regiment. It is 105 years since the original unit, a regiment of Mounted Riflemen, was formed to open and protect a route to the Pacific Northwest. The Third is now stationed at Fort George G. Meade in Maryland, where it carries on its long service as one of our military's top mobile units.

Tanks Plunge Over 38th, Dashed Back Safely
EARNEST ROBERTS, to enter North Korea...
NYO, March 31.—American tanks dashed across the 38th Parallel into North Korea and returned to the 38th Parallel.

U. N. TANKS PURSUE REDS FALLING BACK TOWARD PARALLEL
U. N. TANK PATROL CROSSES PARALLEL IN CENTRAL KOREA
Move Over Border Is the of Kind Since Communists Began Recent Offense
Tanks Probing North of Seoul Meet Only Small Enemy Groups—Action in East
By LINDSEY PARBOTT
 Special to The New York Times
TOKYO, Thursday, May 3.—United Nations armored task forces pushed out far ahead of Allied lines in western Korea yesterday.

2 U. S. Tank Columns Drive Over Parallel; One Later Withdraws
Force North of Uinjongbu Beats Off Reds' Attack In Stay of 3 1/2 Hours
By the Associated Press
TOKYO, Mar. 31.—Two American tank columns stabbed across the Red Korean border today in a daring challenge to a Chinese offensive buildup.

U. N. Tanks aross Parallel. Enemy Started Drive
At least two American tank columns crossed the 38th Parallel into Communist territory.

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U. S. Tank Column Crosses Parallel Into North Korea
Half Mile Advance
U. N. Tank Unit Press Pursuit of Retreating Reds
PARALLEL CROSSED BY U. S. TANK FORCES
TOKYO, Sunday, May 6.—The United Nations tank and infantry columns pushed up after the Communist invaders fell back again.

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Sum & Substance

A regular feature in ARMOR, where you may express your views in approximately 500 choice words—the effective medium between the letter and the article. This section is open to all on any subject within the bounds of propriety. Name and address must accompany all submissions. Name will be withheld upon request. No pseudonyms.

Day by day, ground arms personnel along the red line of battle in Korea are molding the experience in combined arms teamwork that is so essential to success in warfare. Much of the story centers on tank-infantry operations. ARMOR turns to the junior leader for a view of his horizon of war, proudly presents this roundup by tank platoon leaders.—Ed.

The writer of the following served as an enlisted man in World War II, in Alaska and the ETO. He participated in the Normandy, Northern France, Ardennes-Alsace and Rhineland campaigns as a Field Artilleryman. Graduating in 1949 from the Officer Candidate Course at the Ground General School, he attended the Basic Course at The Armored School and was assigned to the 72nd Tank Battalion at Fort Lewis, Washington, moving to Korea with that unit, where he has served since last August as a combat tank platoon leader and tank company executive officer.

Although the nature of the terrain and the type of opposition make the Korean action essentially an infantryman's war, much of the action hinges on tank-infantry operations. In this respect, more often than not tankers find themselves in the unenviable position of being an attachment. As command responsibility then lies with the infantry commander, the tanker becomes the supporting element, with little voice in the planning phase as against a major burden in the execution.

Ordinarily, for tactical employment, one company of the tank battalion is attached to each infantry regiment. This is the start of a farming out process which tankers feel is wrong. One platoon of the tank company is next attached to each infantry battalion in the regiment, and the battalion commander then passes it down to an infantry company. If the infantry company commander feels he can break it down further he may assign the second squad to work with the tanks. All of this is based on the infantry commanders' lack of familiarity with employment of tanks.

Too often the tank platoon is assigned the job of taking the infantry regimental objective, with only such accompanying infantry as can ride the tanks and without reaching answers to such questions as "What will the rest of the regiment be doing? Will artillery fire be coordinated to hit likely areas of enemy defense? How will organic weapons assist the tanks in accomplishing their mission?"



Lieutenant Harper.

Such offhand Georgie Patton action doesn't work in Korea and at this operating level, for very good reasons. At the first burst of fire from a well-entrenched enemy, the infantry will be compelled to dismount from the tanks and seek cover; the obvious approach will be the most heavily defended. The road will be mined every ten yards. In actual execution the plan will be somewhat less bold than envisaged. The armored thrust to the road junction will be less spectacular than the broad sweeping arrows in the field manuals may have led one to expect. The infantry, assisted by tank fire, will be compelled to occupy the high ground,

in order that the engineers can clear the mines, and all will move into the town at a snail's pace. Meantime, the infantry commander will be jumping up and down screaming, "Why don't the tanks get moving?"

You are possibly wondering what has happened to the tank platoon leader. I have often wondered the same thing. You may ask, "Why doesn't the tanker advise the regimental commander on the proper employment of his tanks?" He never has the opportunity. A tank platoon leader working with the second squad of Item Company is never aware of an impending operation until some frantic PFC arrives gasping out his story of how he has been looking for you every place except at the tanks and that the battalion commander says for you to get yourself down there as fast as you can. You have been summoned to receive orders, not to question them. You have one alternative, the easiest, to attempt to execute the plan as presented to you.

Quite recently, for example, during the defense of Wonju, I was attached to a battalion of the 187th RCT which had the mission of guarding a wide valley leading straight into the city. The battalion commander had already chosen positions for me prior to my arrival. He sent his executive officer down to show me where to go. We walked down the road past the MLR and 400 yards in front of the OPLR. In this particular area the road had been filled and the embankment was approximately 6 feet higher than the valley. The executive officer pointed down into the ruins of a partially destroyed village and said "The battalion commander said for you to put your tanks down there tonight." I asked how much infantry the CO intended to assign for local security.

"One squad," was the reply.

I contacted the battalion commander and explained that a tank does not have to occupy ground to control it. Because of the range of their weapons, they can dominate an area by fire power alone. I explained that the enemy ordinarily will not attack a tank unit, but will maneuver around the tanks and hit the position from a direction which restricts the use of tank fire. "If I go into position down there the road embankment will completely mask my BOG and will render my coaxial machine gun and tank cannon ineffective at ranges nearer than 800 yards. If we are attacked, the situation will be sufficiently confused without adding the additional noise and psychological effect of tanks repositioning themselves—an operation which will mean that during the early phases of the action, just when you need fire the most desperately, the tanks will not be able to support you. We need a position from which, if the need should arise, we can send a shell flying down this valley 1000 yards before it detonates and cover the intermediate area with our machine guns—a position from which, if you are chased off of a hill, we, without moving, can deny the area to the enemy and at the same time cover your withdrawal." The Colonel, in a voice rumbling with conviction, said: "Lieutenant, if you are not willing to take the same risks my men are taking, I don't think you should be in my battalion." That answer epitomizes our greatest problem in Korea.

I recommend that when a tank company is attached to an infantry regiment the entire company be attached to the infantry battalion operating in the terrain most favorable for tank employment. The tank company organic to the infantry regiment should also be attached to a battalion and utilized in armored missions. Far too frequently the regimental tank company is at the mercy of infantry officers and receives assignments such as escorting engineers 20 miles from the front. The infantry relies on tanks to perform missions which they themselves could perform more satisfactorily. I have in mind road blocks. Quite often a platoon of tanks is detailed to set up a road block to screen refugees, a job which could be handled quite adequately by one machine gun and two guards.

The tank company commander should participate as a staff member in all operational conferences concerning the employment of armor in any capacity.

Since ordinarily the objectives assigned to infantry elements are hill masses offering a vertical target, it is logical to assume that overhead tank fire would constitute a routine phase in the coordinated fire plan. But this is not the case. The infantry commanders will not agree to the use of overhead assault fire by tanks. Although during the initial preparatory fire I have often demonstrated to them the accuracy and devastating effect of the coaxial machine guns used in conjunction with the tank cannon, only on one occasion have I been permitted to employ tank fire in this manner. I recommend that this type assault fire be employed during training of all infantry units.

The most difficult problem yet to be solved in infantry support is the development of a system of individual target designation. We have found that the involved method of designation by radio is both inaccurate and time consuming. On one occasion, when operating with a platoon of infantry, we collected all the tracer ammunition in the platoon and reserved it exclusively for use of the

The writer of the following is a 1950 graduate of the United States Military Academy. Following a brief assignment as reconnaissance platoon leader in the 3d Armored Cavalry Regiment at Fort Meade, Maryland, he was transferred to Korea for an initial assignment as combat platoon leader in the 8th Cavalry Regiment. In recent months he has been a combat tank platoon leader with the 70th Heavy Tank Battalion.

Once again the war in Korea has proven the value of the tank-infantry team. Just as the tanks provide essential, accurate, direct fire support for the doughboys, so does the infantry provide close-in protection for the tanks.

Our field manuals are sound on this doctrine, but it has taken the hard bite of experience to impress these facts on commanders in the field. Too many of our tanks were overrun by enemy night attacks be-

infantry platoon leader and squad leaders to designate point targets for tank fire. This is impractical when operating with larger units. Perhaps a green tracer is a partial answer, to be issued to selected individuals and reserved for coordination of tank fire.

I have found that an effective method of employing tank fire to support advance of infantry is to set up a base of fire with one platoon about 800 to 1,000 yards from the objective. At this distance the tank commanders are relatively immune from enemy fire and are free to use their binoculars and to add the deadly fire of their .50 caliber machine guns. Then with the remaining platoons available, move forward, firing, searching for more advantageous positions, reconnoitering for by-passes, discovering areas from which you can bring tank fire to bear on every side of the enemy positions.

Movement is a vital part of the psychological effect of tank fire and should always be employed whenever possible. By following this principle, we have often caused the enemy to abandon strongly fortified positions and allowed the infantry to walk forward, unopposed, to occupy assigned objectives.

1ST LT. ROBERT S. HARPER

cause the tanks were on or outside defensive perimeters, or had insufficient infantry dug in around them.

In addition, armored patrols often have had to pass through defiles or very rugged areas without enough infantry to protect them against enemy antitank weapons. Three tanks in my company were hit by enemy bazooka fire (captured United States 2.36's and 3.5's) at ranges of 25-100 yards. One hit was on the flat left sponson of an M4A3E8, which wounded all the crew and set the machine-gun ammunition on fire; quick work by another tank crew put out the fire before it became serious. During the same action, another 2.36 bazooka round, fired from the right front, hit my tank at forty-five degree angle on the front slope; however, the round detonated on some five-gallon water cans we were carrying on the front slope, and the shaped charge jet barely penetrated the fighting compartment. Infantry support on these

patrols would probably have flushed out the bazooka teams before they could have scored on the tanks.

Close infantry support of tanks has greatly improved since the campaign against the Chinese began, but the lessons learned by costly experience should have been learned in training.

In regard to the technical aspects of our tanks (the 70th Tank Battalion has used M4A3E8's throughout the Chinese campaign) we would like to see improved radios to provide more accessible sets and a single set for tank-to-tank and tank-infantry communication. We want a .50 or .30

The writer of the following graduated from the United States Military Academy in June, 1950. He served briefly as a reconnaissance platoon leader with the 3d Armored Cavalry Regiment at Fort Meade, Maryland, and arrived in Korea in November, 1950. He spent four months as combat tank platoon leader, a short period as assault gun platoon leader, and is now serving as Assistant Battalion S-3, of the 89th Medium Tank Battalion.

The Korean War has brought to light a facet of tank warfare that is relatively new to the United States Army—the defensive use of armor as part of the holding garrison along the main line of resistance. In accordance with the nature of the typical Communist offensive which has been encountered in Korea, the mission of armor used in this manner is direct support against the attack of massed manpower, especially at night. This use of tanks has been dictated in Korea more by the tactical necessity of substituting firepower for manpower than by any qualification the tank may possess as a night-fighting weapon. There are many drawbacks to the employment of tanks at night: the difficulty of discerning targets at a distance; the relative blindness of the crew at close ranges; and the possibility of running into obstacles or friendly positions in the dark while maneuvering the tank. Despite these drawbacks, it has been demonstrated in Korea that given ample maneuver room and sufficient infantry for outposts and close-in protection, the tank unit is a potent weapon against mass night attacks.

It was demonstrated in World War

caliber machine gun on a skate swivel mount for use by the tank commander or loader against ground and air targets. Also, a .50 caliber coaxial machine gun would give the long-range, accurate fire which is necessary: the .30 caliber tracer burns out at 800-900 yards, making accurate coaxial fire at greater ranges impossible.

In conclusion, our tankers and doughboys have learned in combat the tactics that should have been learned in training, the principles stated in the Army's Field Manuals.

1ST LT. JOHN R. HENDRY

II that the tank platoon is most effective when employed as a mutually supporting unit: in Korea, it has been shown that this method of employment is doubly essential at night when the unit is positioned on the MLR. Despite the fact that the ene-



Lieutenant Tilson.

my's offensive antitank weapons, particularly since the Chinese Communist intervention, have consisted almost entirely of weapons which require the user to move in close and therefore expose himself to fire, experience has shown that a single tank is unable to protect itself satisfactorily against mass attacks. On the other hand, in instances where a tank platoon was employed as a unit, overwhelming numbers of the enemy have been repulsed with heavy casualties, even though individual enemy soldiers penetrated between the tanks.

The tank-infantry team, as in all operations involving armor, is ex-

tremely effective at night when employed in a planned defensive situation. Infantry provides early warning of the attacks, increases firepower, keeps off tank-hunters, prevents infiltration, and protects the position from flanking movements. The tank unit can generally protect itself by fire and maneuver, but the assistance of infantry is vital in order to hold a terrain feature or to prevent infiltration.

In operations at night constant vigilance must be maintained. Enemy attacks in Korea generally come so swiftly and with so little warning that positions not properly outposted or sufficiently alert may be overrun before firepower can be brought to bear on the enemy. Early warning of attacks is particularly vital to the tank unit, due to the fact that a certain time interval is necessary to allow all crew members to get in their positions, establish communication, and be prepared to exert maximum firepower on the target.

Artificial illumination has proved to be invaluable in night defensive operations. Antiaircraft searchlights and artillery flares have been used extensively to illuminate critical terrain. Trip flares, which may be carried and set out by the tank unit itself, provide in addition an excellent warning system. Houses and haystacks, or cans of gasoline placed in front of the lines, may be set on fire by tracer or by white phosphorus shells to provide additional illumination. The use of one or a combination of these methods vastly improves the effectiveness of tank fire, and also takes advantage of the marked enemy disinclination to silhouette himself against a lighted area.

The principles of the use of armor have remained unchanged in Korea, and it must be emphasized that the techniques of tank warfare in Korea do not have universal application. However, the methods of utilizing tanks in defensive operations at night and against a massed, fanatical assault deserve close attention. The situation we face now in Korea we will undoubtedly face again in guerrilla-infested areas, and well may face again in battle against an enemy who makes unstinted use of great supplies of manpower.

1ST LT. GEORGE P. TILSON.

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The writer of the following enlisted in the Air Force in mid-1943 as an Aviation Cadet. He entered the United States Military Academy in 1946, graduating with the Class of 1950. Following an initial duty assignment with the 2d Armored Division, he was transferred to Korea, where, since the Fall of 1950, he has been a combat tank platoon leader with the 64th Heavy Tank Battalion.

With more and more emphasis being placed on tank-infantry operations in our Army, some attention must be placed on such operations with friendly foreign troops. A fine current example is the operation of American tank units with elements of the ROK Army in Korea.

As may be expected, the language barrier is the greatest single bar to effective coordination. In March, 1951, the First Platoon, Company C, 64th Heavy Tank Battalion, was operating with the 15th ROK Regiment in the area north of Seoul. On this particular mission the tank platoon, with one company of ROK infantry and a platoon of ROK engineers, supported by artillery, was assigned to attack a hill just to the right of the MSR, held by an estimated company of North Korean troops.

The ROK company commander understood a little English, but to be on the safe side an ROK interpreter carrying an SCR 300 was assigned to go with the infantry in order to maintain better contact with the tanks.

The Task Force crossed the LD with infantry mounted, the ROK company commander and interpreter with the tank platoon leader on the lead tank. The engineers had gone out several hours earlier to double-check the clearing of mines from the MSR. The column advanced rapidly for about 4,000 yards until it caught up with the engineers. The ROK Regimental I & R Platoon had set up an outpost line on the last hills before contact with the enemy was expected and according to the interpreter had located generally most of the enemy positions.

The infantry were dismounted: two platoons were to assault the hill from the front, with the weapons platoon as a base of fire. One infantry platoon and the engineers would continue forward with the tanks to fire on the hill from the flank. The terrain at this

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position restricted the tanks to the road and the area just off the road to the right. No movement on the enemy position was observed and no fire was being received at this time.

The tanks moved out with the infantry screen on the flanks and the engineers in front. No enemy fire was received for approximately two hundred yards after the column was exposed. At that point, small-arms, automatic weapons, and mortar fire fell about the three leading tanks. Four engineers were casualties in the first few seconds. The enemy positions revealed by their fire were immediately taken under heavy tank, machine-gun and mortar fire. As the enemy fire did not slacken at once, artillery was called down on the crest and reverse slope of the objective. In a few minutes, enemy fire had dropped to occasional rifle shots. Now, by prearrangement, was the time for the assault. When no infantry moved



Lieutenant Eek.

forward, the tank platoon leader called the interpreter on the SCR-300. No answer; the interpreter's radio was damaged and out of action. He tried for radio contact with the ROK company commander, with no luck. Finally, the tanker tried passing written notes to the interpreter through a near-by ROK soldier. Still no results. About this time radio orders were received to disengage the task force and return to bivouac areas with the mission unaccomplished.

This operation shows how lack of effective coordination and communication can cause the failure of an otherwise well-planned operation.

1ST LT. LAURIS M. EEK, JR.

The writer of the following joined the Army as an enlisted man in 1940, and was assigned to the 7th Cavalry Brigade when it became a part of 1st Armored Division. He was both student and instructor at The Armored Force School and also served in the 5th, 8th and 20th Armored Divisions. He went overseas with the 97th Infantry Division as a platoon sergeant, went to OCS in France and was commissioned in Infantry in 1945. Successfully completing a competitive tour in 1949, he went on to Korea in August of 1950 where he has been a combat tank platoon leader with the 70th Heavy Tank Battalion.

The use of tanks in Korea has been talked and written about many times. It makes a very good subject because it was said they couldn't be used in Korea. They aren't always used the way the book says, but still they are being used successfully.

I believe the best way to describe their use, and the problems encountered, is to describe one day with a tank platoon in action.

It was in mid-August in the Pusan perimeter; we were waiting and expecting a breakout, but not sure which way it would be. North or South. The infantry were short of personnel. We were able to assist both by bolstering morale and accounting for a number of enemy.

My platoon had been assigned an area and we had been working in it for three or four days. We were to help the infantry take and hold a hill. It was just a small hill surrounded on three sides by larger ones. The use of tanks was limited by the terrain. Only on one side was there any place for them to maneuver. We had our choice on this side—either in a stream bed or on a narrow trail across rice paddies. We had not used the trail for fear of falling off into the rice paddies when we backed out, for there was no turn-around.

The day before we had assisted an infantry company in getting the hill. Today we were to cover them and draw fire while they gave up the hill for the third time. The enemy fire from the surrounding hills was so intense they were not able to hold it.

I had planned to send three tanks up the stream bed and two across the trail through the rice paddies. This would give us better firing positions

and we could better help the infantry. I would have to move the platoon about three miles up the stream bed in order to get to my new position. From the time we started we would be under heavy mortar fire. The enemy would just wait for us to start up our engines and they would commence firing. Most of the rounds would be 120mm mortar, but occasionally it would be smaller stuff.

After briefing the platoon we started out. We had moved only a few hundred yards when one of the tanks had clutch trouble. As we found out later, it was a connecting pin sheared off in the linkage. Nothing to do but have the tank returned to maintenance. That left two for the stream bed and two for the rice-paddy trail. On the way up the mortars seemed heavier than the day before. Several periscope heads were broken by close rounds. One round landed on the back deck of one of the tanks. The only damage done was a broken tail light and a dent in the armor. During the next three hours we drew at least one hundred rounds without being hit once. We had to keep moving forward or backward a few yards all the time.

We had plenty of targets to shoot at that day. The small arms fire and .51 cal. antitank fire was very heavy. We fired a basic load of ammo per tank. As we found out later, the infantry walked off the hill without losing a single man. I was in communication with the infantry company commander by 300 radio until my antennas were shot off and then the platoon sergeant took over. My antennas had been shot off before: this was nothing new. The tank commander behind me saw them fall off and knew exactly what to do. When I saw the other tanks start to pull back I knew the infantry had cleared the hill and it was time to move out. As I started to back out of the rice paddies, which was about three hundred yards, my driver called to tell me that an oil line in the transmission was broken and oil was all over the floor. At that point the engine should have been stopped and we should have towed the tank to maintenance. However, the enemy fire was so intense it would have been suicide to try to hook up with the other tank. We continued to back out under our own power until we

could move out of small arms range. As soon as we were clear I had the tank stopped. I still had no communication with any of the other tanks and I was the last one out. As soon as the tank in front saw I was stopped he came back and pulled me in.

At the CP we checked the damage to our tanks. One tank had been hit twenty-seven times by .51 caliber antitank rounds. None penetrated the tank. A .50 caliber machine gun had been hit in the receiver and had to be replaced. One tow cable was cut. A telescope was hit by small arms fire just as we were pulling back. Several vision blocks in the tank commander's cupola had to be replaced. All equipment stowed on the outside of the tank was shot full of holes. (When possible our tanks are stripped before any action.)

Our big guns caused no trouble that day. We had found previously that when firing the 76 we would

The writer of the following served as an enlisted man in the Marine Corps from 1943 to 1946. Upon release from service he attended North Dakota Agricultural College, to be commissioned in the Regular Army upon graduation in 1950. Since the Fall of the year he has served as combat tank platoon leader in the 70th Heavy Tank Battalion.

The men of the 70th Tank Battalion along with tankers in other armored units committed in the Korean Campaign, have, through the use of their native intelligence and imagination, proven that the only things that tanks can't do are fly and float.

At the beginning of the conflict, armor was considered to be out of its element in the rugged mountains, soft rice paddies and poor roads of Korea. These obstacles, along with the adverse weather conditions, were considered to be of great magnitude: it was thought that the role of armor in the campaign would be one of long-range support, or of stationary road blocks—the only exception would be in the more favorable regions in the west and west central sectors, where armored units would be able to give direct support to the infantry in offensive action, and then exploit the success of the attack with patrols deep behind the enemy's lines.

have trouble loading after firing several rounds. The reason for this was that large flakes of unburned powder would stick in the breech thereby preventing rounds from seating fully. We always carried little swabs and after firing each round would wipe out the breech. We've never had trouble since then.

The communication worked very well except when my antennas were shot off. Of course we were never more than a thousand yards from the infantry.

Since that day tanks have been used many different ways and for many things. We have been used to transport men and equipment when trucks were not available, haul wounded to the aid stations, escort supply trucks, and pull vehicles and guns out of the mud. All of these are not in a book, but tanks have been used in Korea.

1ST LT. THOMAS W. KELLEY.

Time and tankers have changed all this; tanks have been used to ferry troops and badly needed supplies across rivers which were over the fording depth limits; this was done simply by moving through the water rapidly enough to give a tidal wave effect in front, causing a reduction in the depth around the exhausts and the engine compartment. Fordings of close to four and one-half feet in depth have been made successfully in this manner.

The muddy rice paddies offered one obstacle that was hard to surmount: in most cases only extensive engineer work would have made passage possible. The tankers had to find a quicker means of getting through. The answer was found in the regimental S-2 section, in the careful study of the maps of the area, and in some cases a personal reconnaissance into "Indian Territory." The route found around the paddy area was often a winding path along the fingers leading down from the main ridge lines, or up the rocky stream beds, sometimes going miles out of the way to bring the tanks into the area where they were needed for support. The infantry has found that the tanks will be there when needed; if the terrain is impossible to get through it will take just a little longer.

The coming of cold weather elimi-

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nated the paddy hazard, but brought with it other problems more difficult to overcome. In almost all operations the crews were working under weather conditions so severe that only constant movement, or riding in their sleeping bags when possible, kept down cases of frostbite to a minimum. The ice and snow on narrow mountain roads also caused considerable trouble; it was found that straw mats, which most tanks carried, offered excellent traction when placed on a particularly slippery mountain road where one slip could mean the loss of a tank with its crew.

The coming of warmer weather has brought with it the most favorable weather for tanks in the entire year.

The writer of the following is a graduate of West Point, Class of 1950. A brief tour at Fort Riley, Kansas, was followed by transfer to the Far East Command, where he was first assigned to the 8th Cavalry Regiment. One month later he moved to his present post of combat tank platoon leader of the 70th Heavy Tank Battalion.

As a combat tank platoon leader you are appallingly aware of how small a segment of the whole war you see. You wonder—ponder—how are things on the left? the right? You curse your lack of information of the "big picture" and then thank God you are not a gunner with only a sight and periscope to look through.

But you learn—of necessity at an accelerated rate; not always the school solution, but a solution, just the same.

Inevitably any discussion of Korea leads to terrain. At the start of the action, it was often said that tanks could not be successfully used over the Korean terrain, and when first I saw the Korean hills from a ship in Pusan Harbor, I was about to add a vociferous "amen." This misconception has long been dispelled by the exploits of armor in Korea, and daily battle accounts testify to the pre-eminently successful use of armor against the Communist forces over all types of terrain and, I might add, in all types of weather.

Terrain has greatly influenced the manner in which tanks are utilized, but certainly has not made their use impractical. That fire power, ma-

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The ground is fairly dry and the paddies are capable of carrying tanks if a little care is taken in choosing a route to cross them.

The rainy season scheduled to start in the next six or eight weeks will be the beginning of the second cycle of adverse conditions for armor operations. The change will not be anticipated with pleasure; war is never pleasant, but it will be met with confidence by tankers, who know they have overcome all obstacles offered by the enemy, weather, and terrain, so far with success, and are capable of doing any job required to bring the conflict to a successful completion.

1ST LT. ROBERT L. BROWN

neuverability and shock action is still there.

Except during the cold winter months when they are frozen, the boggy Korean rice paddies are in virtually all instances impassable. Furthermore, even with the paddies themselves frozen, maneuverability was limited by the extensive system of irrigation ditches common to Korean agriculture, which were effective anti-tank ditches; and by high paddy dikes which the tanks were unable to climb.

The Korean hills are abrupt and rugged, so that tanks are usually limited to the lower ground. Tank routes, then, are generally roads and river beds.

Fortunately, in most Korean valleys of appreciable size, there usually exists a creek or river, the bed of which affords the optimum of "tankable country" by Korean standards. In such a location, a platoon may occasionally be used in a "spread" formation as a "wedge" or "echelon": but usually terrain restricts the formation to a column while the unit is moving. Of course, within an area, the platoon leader can usually maneuver his tanks into another formation.

The versatility of armor has never been more clearly demonstrated. Tanks have added speed and vigor to United Nations attacks, and have bolstered the defense when initiative has passed on occasion to the enemy. Of necessity we've hauled bedding rolls, and in sorrow, evacuated the wounded when no other means could be used. We've often played "fire man," too, and many times have ex-

tricated infantry contact patrols from "embarrassing situations" in which the patrol has found itself pinned down upon contacting the enemy. Covering fire from the tanks has made a safe withdrawal from such precarious situations possible.

Infantry unit commanders have learned the value of tank-led patrols to range into enemy territory to ferret out enemy positions and to shoot up installations and supplies with the resulting disruption and disorganization of the enemy. They have also come to admire the highly flexible and dependable communications net indigenous to armor. Often, when action is beyond the effective range of the less powerful infantry radios, tanks have helped to keep infantry battalion and regimental commanders abreast of the situation by radioing reports to a radio-equipped liaison jeep stationed at the infantry Command Post. The tank radios also net with artillery channels so that the platoon leader may call for and adjust artillery fire upon opportune targets. The aerial observer, also available by radio call, has proven of inestimable value in giving tankers a "bird's-eye view" of the situation ahead and in actually directing the fire of tanks upon targets.

We still sweat out task forces, remembering our dash to the beleaguered, heroic 23rd Regiment at Chipyeong. There we learned close-in protection against tank killer teams, armed with bazooka and charges, lying in wait in ditches and culverts. We've become wary on elevated roads, bridge by-passes and approaches.

We feel our greatest contribution to United Nations successes in Korea has been the close and effective fire support of our attacking infantry. The tank-infantry team has never been more fully utilized than in Korea, where tanks have reduced enemy strong points, and routed or destroyed communists in foxholes and bunkers from which they direct their fire upon friendly troops. Teamwork has never been better, and a close kinship has developed.

The doughboys have come to appreciate the support of their comrades in the ground team—the tankers and their tanks.

1ST LT. THOMAS W. BOYDSTON

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The writer of the following attended Oklahoma Military Academy, and entered the Army in 1943. In 1949 he attended the Officers Associate Basic Course at The Armored School. Since last August he has been a combat tank platoon leader with the 5th Medium Tank Battalion in Korea.

At 0900 hours, 2 November 1950, the 21st Regimental Combat Team reinforced with Company "A," 6th Medium Tank Battalion, kicked off on its third morning of attack toward the Yalu River town of Sinuiju on the west coast of Korea. Company "A," 6th Medium Tank Battalion, commanded by Captain Jack G. Moss, was the leading element, with my platoon, the second, on the point.

The column moved ahead aggressively. Sfc Ralph Lightcap, a veteran tankier of two wars, commanded the lead vehicle. He was well acquainted with the enemy capabilities and had instructions to move as rapidly as possible so we could treat possible obstacles with proper respect, when we came to them.

About fourteen miles east of Sinuiju, we entered a small valley terminating in a narrow pass. Sgt. Lightcap observed and fired upon a

camouflaged T-34, 400 yards ahead on the left of the road. His fire was returned by a terrific volume of fire from both sides of the road, and at a greater range up the pass.

The leading three tanks were un-



Lieutenant Wilcox.

able to get off the road, for our infantry, riding on our rear decks, had taken cover in the ditches. The second section, plus the entire third platoon (1st Lt. Bernard D. Fahey, commanding) were able to get in hull defilade behind a rise of ground to our right flank. One section of the first

platoon, under M/Sgt Clarence Allison occupied a reserve position, to the rear.

Sgt. Lightcap's second shot destroyed one T-34. The enemy's camouflage was perfect and my tank fired three rounds at a muzzle flash before that enemy tank was destroyed. My gunner spotted another flash in his sight and made a one-shot kill. Sgt. Lightcap nailed the fourth tank on that side. In the meantime, two more were destroyed by tanks commanded by Sfc James Hoback and Leonard Baker. Two more and one SP were hit, but who destroyed them hasn't been determined.

The enemy's initial volley knocked off my muffler, broke Sgt. Lightcap's track and set a fire on his tank. My bow gunner, Pfc Elmer Witch, without regard for his safety, ran forward and extinguished the blaze. On his return, his jacket sleeve was twice ripped by small-arms fire.

The battle ended as suddenly as it started. Our doughboys mopped up the enemy infantry in short order and we took count of losses. The enemy losses consisted of eight tanks, one SP and an unknown number of men.

1ST LT. ROBERT D. WILCOX

ARMY ADOPTS NEW ALL-TEMPERATURE GREASE AFTER EXTENSIVE TESTING

A new grease which performs equally as well in tropic heat or Arctic cold has been adopted for use on all Army vehicles and artillery pieces, the Department of the Army announced recently.

The all-temperature lubricant, developed by the Army Ordnance Corps, is expected to simplify the Army's supply problem by replacing at least six different greases. It is the result of extensive tests, conducted over the past three years, which started with "Operation Greaseball." The operation involved a convoy of twelve 2½-ton Army trucks which left Aberdeen Proving Ground, Maryland, in August, 1948 and covered 20,000 miles of driving in varying climates.

Previous experience had shown the Army that ordinary lubricants suitable for use at high temperatures solidify or become too viscous for use at extremely low temperatures. Consequently, such lu-

bricants must be removed from both automotive and artillery items and Arctic lubricants applied prior to shipment from one temperature zone to another.

Approximately 30 man-hours were required to convert to cold climate operation a vehicle that had been lubricated with ordinary warm weather greases. This included disassembly of transmissions, differentials, wheel bearings and other lubrication points, followed by a complete washing out, and then re-assembly with cold weather grease.

The Army-developed all-temperature grease eliminates such involved operations. Equipped with this grease, the vehicle is made readily available for shipment to Arctic weather regions after engine oils and gear lubricants are drained and refilled.

The new lubricant is suitable over the temperature range of minus 65 degrees Fahrenheit to plus 125 degrees Fahrenheit.

Logistics and Trains in the Armored Division

by CAPTAIN JEOFFREY FORSYTHE

THIS article was prepared to present a brief and concise picture of logistics and trains within the armored division. We are prone to regard logistics as a subject of minor importance and are inclined to take the matter for granted. It is conceded that there is very little color or glamour attached to logistics. Tactical and intelligence activities offer far more opportunities for glory and expression of daring and combat ability. It is further conceded that logistics is geared to support combat but it is emphatically denied that logistics is a subject of minor importance or a matter to be taken for granted. It is an obvious and fundamental truth that without logistical sufficiency or adequacy there will be no tactical success.

Logistics embraces many fields of activity but in this discussion only the most important essentials will be considered. Those essentials are the provision of supplies, matériel maintenance and evacuation, and personnel casualty evacuation for the armored division. The units, elements, vehicles and personnel who perform these functions constitute the trains of the units and of the armored division.

Every field of military activity is based upon logic and sound established principles. Logistics is no exception. The first principle of logistics, one that should never be forgotten, is that **THE RESPONSIBILITY FOR THE PROVISION OF SUPPLIES, MAINTENANCE, AND EVACUATION RESTS WITH THE UNIT COMMANDER.** Commanders are provided assistants to accomplish these functions but it is the unit commander who will answer to higher echelons for any logistical inadequacy in the unit. Another principle, one for logistical personnel to constantly keep in mind, is that **THE IMPETUS OF SUPPLY AND SERVICE IS FROM THE REAR TO THE FRONT.** Supplies and services must

be pushed forward and made conveniently available to combat troops. Logistical agencies have only one reason for existence and that is to support the combat soldier. The third principle, **ADVANCE PLANNING IS ESSENTIAL,** is rather obvious and basic, yet extremely important. Plans must be formulated well in advance to insure that supplies and services are provided when needed and where needed. The last principle, **PRESCRIBED RESERVES OF SUPPLY MUST BE MAINTAINED IN ALL ECHELONS,** provides insurance. There will be inevitable delays and interruptions in the delivery of supplies. If supply reserves such as spare parts and extra rations are maintained in a unit, the supply delivery delays will not seriously affect the unit. A logistical program based on the above principles will assist any unit in accomplishing its mission.

To clearly understand the logistics of the armored division it is necessary to have some idea of the use and composition of trains in the division. Figures 1 and 2 illustrate the organization and disposition of trains when the division is engaged in offensive combat. The different trains establish the chain of logistical support within the division.

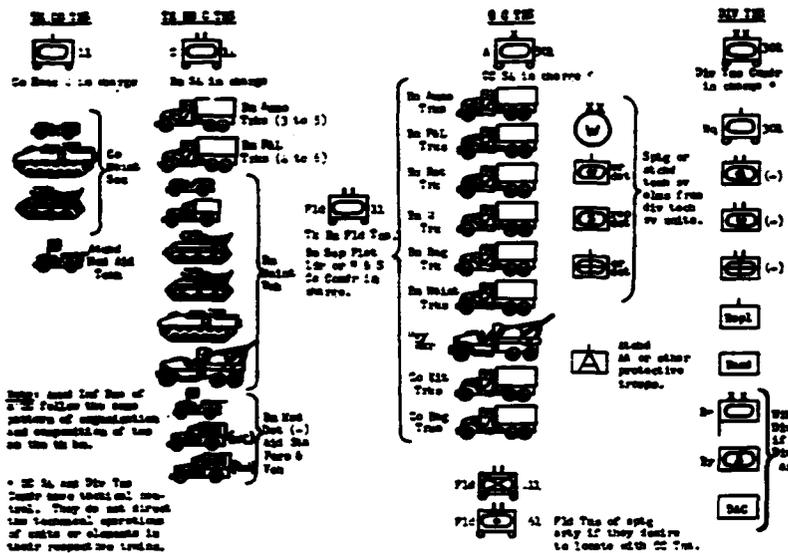
The most forward trains are those logistical vehicles and personnel with the companies. Company trains consist of the company maintenance sections and attached medical personnel and vehicle. In combat company kitchen and supply or baggage trucks usually remain farther to the rear with battalion logistical elements.

Battalion trains consist of the battalion supply, maintenance, and medical elements plus company kitchen

and supply or baggage trucks left with battalion. These vehicles and personnel constitute a sizable group, obviously too large to accompany the battalion in combat. However, when engaged in combat, the fighting units of the battalion will require immediately available logistical support. Such support is provided by the formation of battalion combat trains consisting of battalion supply trucks loaded with gasoline and ammunition, a portion of battalion maintenance, and the remainder of the battalion medical elements. The battalion combat trains are controlled by the battalion S4 and will locate and move in the vicinity of the battalion headquarters. The number of supply trucks and maintenance vehicles in the battalion combat trains will vary according to requirements and availability of road space. Those vehicles and personnel of battalion trains which are not required forward for immediate support will be grouped into what is called battalion field trains. The battalion field trains will include the remainder of the battalion supply trucks carrying gasoline, ammunition, water, rations, and miscellaneous impedimenta: what is left of battalion maintenance; and the company kitchen and supply or baggage trucks. The field trains of a battalion will remain well to rear with the battalion supply platoon leader or headquarters and service company commander in charge.

In order to provide coordinated protection and movement control for all battalion field trains in the combat command, they are grouped and formed into an intermediate trains formation between the battalions and division. This group of battalion field trains is called combat command trains. There will also be elements of the division technical services supporting the combat command. These supporting technical service elements will accompany a committed combat com-

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SCHEMATIC OF COMPOSITION OF TRAINS IN THE ARMORED DIVISION
Figure 1

mand and will be considered as part of the combat command trains. (See Figure 1 for normal composition of combat command trains.) The combat command S4 is not charged with the technical operations of the battalion field trains and the supporting technical service elements. His function is to coordinate the movement and security measures for the combat command trains as a whole.

Behind the major commands will be found division trains consisting of headquarters company of division trains, the ordnance maintenance battalion minus the ordnance companies or detachments supporting the combat command; the armored medical battalion minus those elements supporting the combat command; the quartermaster battalion minus forward supply installations; the replacement company, and the division band. The division headquarters rear echelon, a rear signal detachment, and the division administrative center (DAC) may also be located in the division trains area.

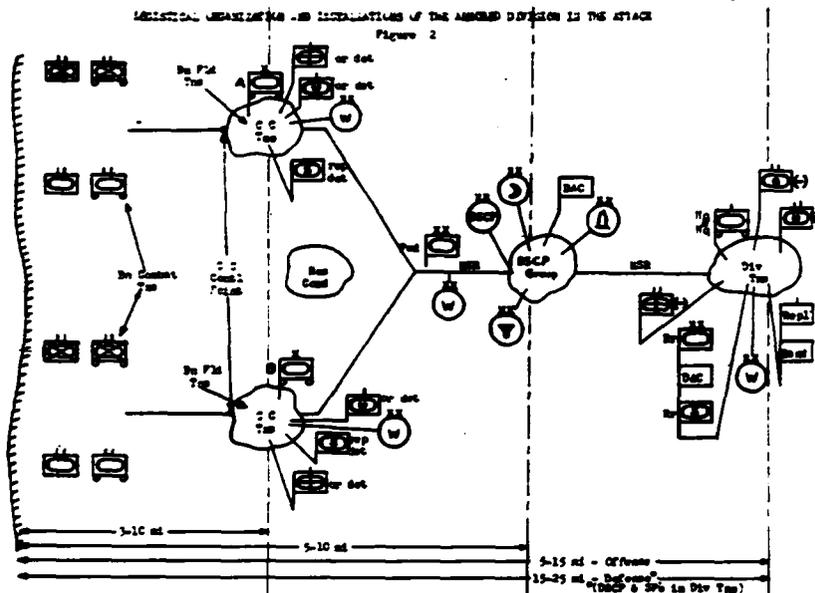
Forward of division trains and behind combat command trains, the quartermaster will operate the Division Supply Control Point (DSCP) and his Class I (ration) distributing point and Class III (fuels and lubricants) supply point. These installations will be mobile. The DSCP acts as an information center for logistical traffic. Current information concerning the location and status of supplies and services of all the division and supporting army logistical installa-

tions is immediately available. All supply traffic from the forward units will be required to report to the DSCP for information and instructions. Frequently the armored division will be authorized to carry ammunition in excess of the division basic load. When such is the case, division quartermaster truck platoon transportation will be utilized to mobilize a division Class V (ammunition) supply point. This mobile Class V supply point will locate near the quartermaster's Class I distributing point and Class III supply point in the vicinity of the DSCP. These installations and the Division Ammunition Office (DAO) will comprise the Division Supply Control Point Group. This group is situated

well forward on the division MSR in order to expedite the flow of gasoline, ammunition and rations to the front.

The logistical picture within the division is completed but there remains the question of the sources of supply for the division as a whole. Army supports the divisions of the corps by providing supply points and services for each corps in the army. These supply points and service installations are operated by army troops but are located in the corps area. To the division, the most important of the army supply points in the corps area are the army Class I supply point, the army Class III supply point and the army Class V supply point. It is here that the divisions of the corps draw their rations, fuels and lubricants, and ammunition.

Knowing the logistical organization and composition of trains within the armored division it is possible to trace the flow of supplies to the front. The flow of Class I supply (rations) is reasonably automatic and is systematized on a daily basis. Rations for the division are drawn daily by the division quartermaster from the army Class I supply point in the corps area. The rations are then broken down into battalion and separate company lots at the division Class I distributing point and prepared for distribution to units. Unit ration trucks pick up their rations on a prearranged schedule. Battalion ration trucks then return to their respective field trains and the rations are broken down into company lots for distribution to company kitch-



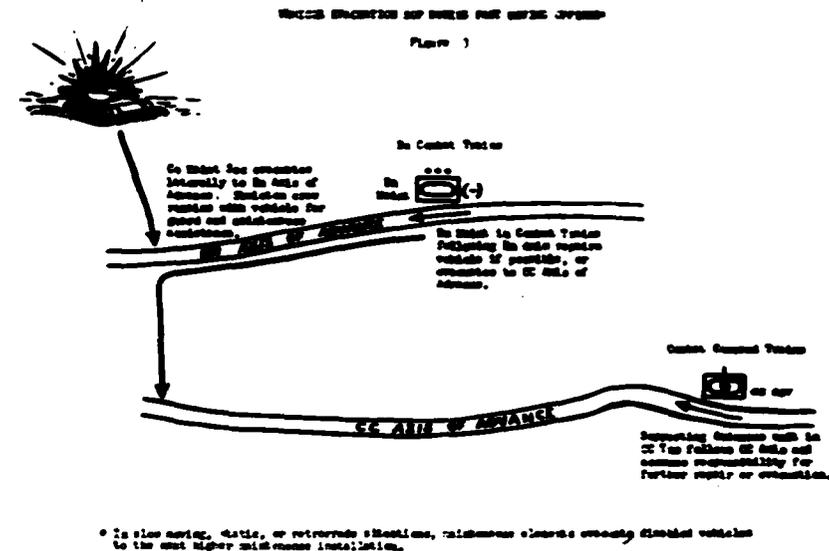
ARMOR—May-June, 1951

en trucks. If "C" rations or "5-in-1" rations are drawn they must be distributed to the individual or vehicle crew consumers.

Procurement and distribution of Class III supplies (fuel and lubricants) do not pose any particularly difficult problems. Gasoline for companies of a battalion is immediately available and on call in the battalion combat trains. During a lull in fighting or during darkness, gasoline trucks will be dispatched to companies whenever called for. These trucks will attempt delivery to each individual tank or other vehicle in the company. After completely refueling the company, the truck or trucks will collect empty drums and return to battalion field trains. In the meantime, the battalion S4 will have maintained the level of gasoline in the battalion combat trains by directing that a gasoline truck or trucks come forward from the field trains and join the combat trains. After trucks loaded with empty gasoline drums have been assembled in the battalion field trains they are dispatched to the DSCP. Personnel of the DSCP will direct the convoy to the division Class III supply point if sufficient gasoline is available, otherwise to the army Class III supply point in the corps area. At either supply point, gasoline will be provided on an empty-drum for full-drum exchange basis. Refilled trucks then return to their battalion field trains and await call to join the battalion combat trains. This completes the cycle, a simple and expeditious procedure.

The procedure for the procurement and distribution of Class V supply (ammunition) parallels closely that of Class III supply. Ammunition will be sent forward from the battalion combat trains to the companies when called for, usually in conjunction with refueling activities. Briefly, the process is as follows: Empty ammunition trucks are assembled in the battalion field trains; the battalion munitions officer prepares a Transportation Order (request for ammunition) and dispatches the convoy to the DSCP after clearance is obtained from the combat command S4 at the combat command control point. The DSCP directs the convoy to the DAO where unit Transportation Orders are authenticated. When unit Transportation Orders are authenticated they are

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then valid requisitions for ammunition and may be presented at the division mobile Class V supply point, if the division has been authorized ammunition in excess of the basic load, or the army Class V supply point in the corps area for replenishment of ammunition. Refilled unit ammunition trucks then return to their respective field trains and loads are adjusted and prepared according to the anticipated requirements of the combat companies.

Class II (prescribed allowance equipment such as T/O&E) and Class IV (generally construction and fortification materials) supplies are not so readily available as are Class I, III, and V supplies. The procurement of Class II and IV supplies is a matter of requisitioning or directly exchanging unserviceable items "over the counter" for serviceable items. Unit requirements for these supplies will be satisfied when the technical services of the division obtain the supplies and make them available.

The division engineers provide water with engineer water point detachments for the major commands. When a combat command is committed, a water point detachment will accompany combat command trains. Water trailers towed by company kitchen trucks and the water cans carried by a battalion supply truck may be filled there. Water is usually distributed with rations.

Supply activities within an armored division are only a part of the logistical effort involved. Maintenance of equipment and evacuation of dam-

aged and unserviceable materiel are included in the logistical program of the division. Engines, wheels, and tracks must turn. Those which cannot turn must be repaired or evacuated to a maintenance facility which can perform the necessary repair. Companies and battalions have organic maintenance elements which should perform all maintenance and repairs that time, available tools, and skill of personnel will permit (organizational maintenance). Repairs beyond unit capabilities will be accomplished by division or army ordnance units (field and depot maintenance). See Figure 3.

Evacuation is not confined to materiel. Casualties must receive prompt attention and be processed through the medical chain of evacuation as rapidly as possible. Companies of the combat battalions are provided one or more company aidmen and a 1/4-ton ambulance (litter jeep) with driver from the organic medical detachment of the battalion. These small medical aid teams with the companies evacuate casualties from the battlefield to the battalion aid station. Ambulances from the medical company supporting the combat command evacuate the casualties from the battalion aid stations to the division clearing station, either a small one in the combat command trains area or a large consolidated clearing station in the division trains area. This medical evacuation SOP remains the same for both offensive and defensive operations.

The logistical program presented in this discussion is as advocated by The Armored School.

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Fresh armored infantry deploy into dismounted action following an approach in which the losses from small arms and artillery have been reduced by mobility and armor protection.

A NEW ARMORED PERSONNEL CARRIER

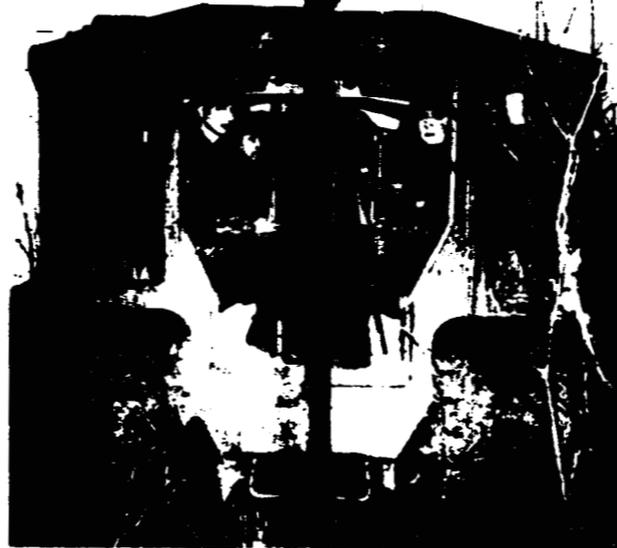
The Army has just released a new vehicle for Armor—the T18E2 Armored Personnel Carrier. A squad-size carrier with a crew of one, the driver, provides all-over protection for its occupants against small arms fire and shrapnel, and will carry them over the same terrain as tanks it accompanies can operate, thus putting fresh troops on the objective when the moment arrives for dismounted action. The vehicle is powered by a six-cylinder Continental engine and the Allison cross drive transmission. On improved roads it will travel at a sustained speed in excess of 35 mph. It has a .50 caliber machine gun and will be produced by the International Harvester Company.



A full track vehicle, the new personnel carrier will traverse the same terrain as the tanks, putting infantry with the spearheads, creating the team to meet enemy opposition.



Armored infantrymen dismount from their carrier to come to grips with the enemy on the objective.



Infantrymen dismount from the carrier through double doors.



Side ports may be opened or put in semi-closed position and used by riflemen for close-in protection.



The half-track had limitations, yet did a big job in World War II.



The tank has greened under its additional load.



The M39 lacked important overhead protection.



The platoon size M44 armored utility vehicle proved unwieldy.

There has been increasing attention to the subject of armor in a variety of sources, evidence of the importance attached to it in the ground warfare picture. ARMOR receives so much deserving original material that it is not necessary to draw on other media for its coverage. However, the big play elsewhere has produced such a number of provocative presentations on our

special subject that ARMOR has set aside a solid chunk of space in this issue to round up some of the best for your consideration. This material by no means follows the same line. Each treatment is original within itself. The reader will not find the following block of pages a condensed, highly illustrated and easy-to-take dose. This is serious reading. Sit down and dig in.—THE EDITOR.

Have Armoured Forces A Future?

THE weight of the main types of tank in use has approximately trebled in the last ten years—as a result of continuous efforts to mount a bigger gun and thicker armour. At the same time the number of tanks in what is called “armoured divisions” has decreased. It is now a matter of common remark that the progressive effort to thicken armour has reached the limit of what is practicable and compatible with mobility. But the penetrative power of guns and projectiles has continued to grow. As a natural consequence there is a growing tendency among soldiers to argue that the penetrative power of the tank itself in operations has been curbed. It is even asserted that the tank has met its master in the antitank projectile, and that its military value is on the wane.

The argument would be more convincing if it had not been so often

by **B. H. LIDDELL HART**

repeated, and as often refuted by experience. By tracing the sequence of “ups-and-downs” through the past thirty years we can get a better light on the recurrent argument, and on the reasons why it has carried more weight than events have justified. That will also help to show how far we are from having reached the limit of what is operationally possible for armoured forces. Until we have tried to fulfill requirements which were apparent to clear-sighted thinkers thirty years ago it is foolish to conclude that the tank has “had its day.”

I remember hearing such a conclusion expressed in November, 1919, by a distinguished soldier in a lecture on the “Possibilities of the Next War.” His verdict seemed the more weighty because he had been concerned with

the original production of the tank after the First World War had developed into a static war of trenches. Despite all the tank had contributed, and achieved, in breaking the deadlock in the last year of the war, he could see no further prospect for it. In his survey of future warfare he dismissed it in three sentences—“The tank proper was a freak. The circumstances which called it into existence were exceptional and are not likely to recur. If they do, they can be dealt with by other means.”

His death sentence on the tank was applauded by most of the generals who were present. Only a small band of believers, mainly younger men, took a different view—and had a new vision of the potentialities of the tank.

Soon afterwards the first type of fast tank, capable of a speed of over 20 m.p.h., was successfully produced in England—carrying the practical

The article presented herewith is a complete chapter from the author's recent book DEFENSE OF THE WEST, and is reprinted here with the kind permission of Captain Liddell Hart and his publishers, William Morrow and Company, Inc., of New York.

B. H. Liddell Hart is an internationally recognized military analyst. Following World War I service with the British Army, he retired in 1927 to devote full time to a writing career. He has been a military correspondent for several leading English newspapers, and Military Editor of the Encyclopaedia Britannica. He is the originator of many new ideas and methods adopted in various armies, and has been a pioneer in mechanized warfare concepts. He is author of *The German Generals Talk*.



promise of fulfilling the new vision. Yet, curiously, many soldiers who hoped to revive mobility and “open” warfare were antagonistic to the new means that might make such a revival possible.

That was particularly common among ardent cavalymen, who still cherished the hope and faith that the reign of the horse would continue. Almost every time I met one of their ablest leaders, who then (in the mid-1920s) held the chief command in the British Army, he gleefully assured me that the tank was doomed because of impending improvements in antitank weapons. Such a view, and attitude, persisted in high quarters throughout the twenty years between the wars. Every demonstration of the potentialities of mobile armoured warfare was followed by a disparaging reaction.

The great pioneer, General Swinton, who in 1914 had seen the “armoured caterpillar” vehicle as a solution for the trench-deadlock, concluded his story of the much-resisted development of the tank in World War I by philosophically quoting the Persian proverb: “the dogs bark, but the caravan passes on.” Once again he proved a true prophet.

For in spite of much doubt and obstruction, the tank and the conception of its use continued to progress in England during the years immediately following that war. That was due above all to Colonel Fuller, who had been chief staff officer of the wartime Tank Corps. He preached the idea of “sea warfare on land” conducted by completely mechanized forces—an idea which another member of its staff, Major Martel, had originally suggested as far back as November, 1916, in a paper entitled “A Tank Army”—and by his vivid presentation of the case brought it into the realm of practical discussion. Moreover, in his proposed “Plan 1919” and postwar

writings, Fuller evolved the idea of a deep tactical penetration—driving right through to the enemy's divisional, corps, and army headquarters, paralyzing the enemy's command system and spreading confusion in the immediate rear of his armies. Then, in considering the possibilities of tanks with much higher speed and longer radius than the 1918 type, I evolved the further idea that fast armoured forces could carry out a deep strategic penetration—an independent long-range drive to cut the enemy's communications far back, where his main arteries of supply could be severed. I illustrated it by a treatise on the lightning campaigns of Genghis Khan, drawing the conclusion that fully mechanized forces should be capable of a performance comparable to that of the all-mobile forces of the Mongols. This idea particularly appealed to Lindsay, who became Chief Instructor of the Central Schools on the formation of the Royal Tank Corps in 1923 as a permanent arm of the Army. The previous year, with the British armoured cars in Iraq, he had initiated the first trials of an embryo mechanized force.

Early Experimentation

In 1927 the British General Staff decided to create an Experimental Mechanized Force on Salisbury Plain for practical test of the new theories. It comprised one battalion of tanks, one battalion of armoured cars and “tankettes” (the forerunner of the light tank), one battalion of machine-guns mounted in six-wheeled or half-track vehicles, a brigade (regiment) of tractor-drawn field artillery (with one self-propelled battery), and a motorized field company of engineers. Much of the value of the experiment was lost because of the cautious and cramped way in which the force was handled by the infantry-

man who was placed in charge of it. Nevertheless, the “fast group” under Pile (who became the C-in-C of Britain's A.A. Defence in the next war) provided a striking foretaste of what might be achieved by rapidity of movement and mind—above all in exploiting “unexpectedness.” At the same time the Chief of the Imperial General Staff was persuaded to define a policy of training for the force—and future “armoured visions”—on modernized Mongol lines. Unfortunately, a prolonged reaction followed this spurt of progress. The force was disbanded in the autumn of 1928 after its second season of trials—partly as a way of getting rid of the slow-moving infantryman who had been appointed to command the force, and was cramping its potentialities. But the formation of a fresh force, a true armoured force, was deferred longer than had been hoped.

The British Mechanized Force of 1927 attracted the attention of the military world, and progressive soldiers in other countries were keen to try its possibilities. The next country to do so was America. Dwight Davis, the U.S. Secretary of War, attended one of the trials on a visit to England, and when he returned home gave instructions for the formation of a similar force in the United States Army. To soothe the fears of the older arms the announcement emphasized that the new type of force “would not displace” infantry or cavalry. The force itself had an even shorter life than its British forerunner—it was constituted in July, 1928, and disbanded in September. In the years that followed, the United States Army lagged behind the pace of developments in Europe—contrary to natural expectations. Colonel Chaffee, the leading spirit of the new school in America, had a heart-breaking struggle in his efforts to achieve

an advance. General MacArthur was one of the few senior soldiers who had a vision of what mechanized mobility might achieve, but during his time as Chief of Staff he was hampered by opposition from static-minded contemporaries while handicapped by lack of financial resources. In Congress, Ross Collins was a lone voice crying in the wilderness when he constantly argued that mechanized forces would be decisive in a future war.

In America, armoured development was retarded because after World War I the heads of the Army, instead of maintaining a separate Tank Corps as the British did, had followed the example of the French Army in treating tanks as a part of the infantry arm and keeping them subordinate. For France that proved a fatal policy. It can be traced to the complacency that was fostered by victory in 1918. The new school of thought gained some adherence in France, but for all their ardour they made little impression. They were borne down by the weight of superior authority, which rested on old doctrine. The heads of the French Army were supremely convinced that they knew more about war than any other army in the world and were apt to despise all others except the Germans as amateurs. Although not "too proud to fight" they were too proud to learn new ways of fighting.

The main current of mechanized development thus remained in Britain—so long as Germany was disarmed. It moved more slowly than ideas, but in 1931 a complete armoured formation, the 1st Tank Brigade, was at last formed for trial. One of the new school, Brigadier Broad, was this time put in charge of it. He worked out a force of battle drill training in tactics of indirect approach and variable aim. He also systematized the methods of control, laying a good foundation for a longer advance.

Deep Strategic Penetration

But another regrettable interval occurred before this first tank brigade was permanently constituted in 1934. Hobart, who was given command of it, not only developed the tactical methods and wireless control required for fast-moving operations, but set out to practise the method of deep strategic penetration—by an armoured force operating independently of the Main Army.

These trials helped to confirm one's earlier theoretical exposition of its potentialities. But most of the senior generals were by no means convinced by the demonstration. They remained distrustful of the possibility of such long-range strokes, preferring to keep the armoured forces tied more closely to the main body of the Army, and to what they called "the main battle." As a result Hobart's opportunities to continue such practice of tank strategy were curtailed during the next two seasons' training.

The revolutionary possibilities of the new idea were more fully grasped in Germany—especially by Guderian, who was training the tank units which Hitler had just begun to build. For over ten years Guderian, as he has related, had been following British

"I was one of Captain Liddell Hart's disciples in tank affairs."
"Captain Liddell Hart—my first teacher in tank tactics and strategy."

—General Guderian
(The creator and trainer of Germany's armoured forces, who made the break-through at Sedan and led the drive to the Channel in 1940.)

ideas with the keenest interest, and he now enthusiastically seized the chance to put them into practice himself. After the summer of 1935 had been devoted to practice in handling an experimental armoured division, three such divisions were formed in October that year. Each embodied four battalions of tanks and two mechanized "light infantry" battalions, together with artillery, engineers, a motorcyclist unit, and a reconnaissance unit. (By 1939 the number of armoured divisions had been doubled, and by 1940 increased to ten.)

More significantly still, Guderian directed and trained these new-style forces to carry out the idea of deep strategic penetration—operating independently and driving on far ahead of the main mass of the army. The older German generals were almost as horrified as the British generals had been at the unorthodoxy of the idea, as well as its hazards. They wanted to tie the armoured divisions down to the service of the infantry mass. But when war came, opportunity came—to cut

loose from their cautious restraints. The campaign in Poland demonstrated the value of the new idea and diminished the Higher Command's tendency to impose checks upon it. When the campaign in the West was launched, Guderian seized the bit in his teeth and bolted with the reins—his unchecked gallop from Sedan to the sea cut off the whole left wing of the opposing armies. The Belgians collapsed, the British barely escaped by sea, and a large part of the French Army was put in the bag. The armoured forces were then quickly switched south and east for a fresh stroke. After the new French front on the Aisne had been pierced, Guderian's sweep eastward to the Swiss frontier cut off the right wing of the French Army, and led to the fall of France. In each case the break-through itself only opened the way for a solution of the problem; the rapid and deep exploitation was the decisive part.

Blitzkrieg Method

Guderian has epitomized the *blitzkrieg* method as "Mobility, Velocity, Indirect Approach." In a fuller definition of it—with which Guderian expressed emphatic agreement—I set it forth thus:

The secret lies partly in the tactical combination of tanks and aircraft, partly in the unexpectedness of the stroke in direction and time, but *above all* in the *follow-through*—the exploitation of a break-through (the tactical penetration of a front) into a *deep strategic penetration*, carried out by armoured forces racing on ahead of the main army, and operating *independently*.

The pace of such forces promises a decisively deep penetration *so long* as it can be kept up. It is kept up by a torrent-like process of advance, either swerving round resistance or piercing it at a weakened spot—in which case the tank-torrent contracts in pouring through a narrow breach, and then expands again to its original breadth.

It is the *persistent pace*, coupled with the *variability* of the thrust-point, that paralyzes the opponent. For at every stage, after the original break-through, the flexible drive of the armoured forces carries simultaneously several *alternative* threats, while the threat that actually develops into a thrust takes place too quickly for the

enemy's reserves to reach the spot in time to stiffen the resistance there before it collapses. In effect, *both tactical and strategical* surprise are maintained from start to finish. It is a high-speed "indirect approach" to the enemy's rear areas—where his vital but vulnerable organs of control and supply are located.*

The points of this definition are worth keeping in mind when examining the course of operations throughout the war—those which brought quickly decisive results and those which did not.

These points, too, form a guide for the future—showing the conditions that will have to be fulfilled if armoured forces are to play a part in the future comparable to what they did in the immediate past. The improvements of counter-methods and counter-means are bound to make the conditions harder to fulfil, as they did in the last war after 1940, but this *blitzkrieg* method may again prove effective if the means for it are developed on the lines that reason long ago suggested. The armoured forces that triumphed in 1940 were of primitive composition—as Guderian himself and his fellow tankmen quite realized. They were limited by the means then available and their model was far short of the design that the original British exponents of armoured warfare had set forth in the 1920s. But it sufficed to dislocate the opposing armies because the heads of these armies had not really begun to understand the new method of warfare.

The startling success of the German armoured forces in overrunning France aroused Britain's leaders to the practical value of the new theory that had been born there but neglected by

*Since Guderian described himself as my "disciple" in the field of tank warfare it may be of some historical interest to mention that the *concept* of this deep strategic penetration by armoured forces developed in my mind initially from the study of the long-sustained drives carried out by Genghis Khan's all-mobile forces in the Mongol campaigns of the 13th century, while its application against modern mass armies dependent upon railways for supply was made clear in an analysis of Sherman's "marches" and Forrest's dislocating "raids" in the 1864-5 campaigns of the American Civil War. The conclusions were strengthened in a study of the effects that could have been produced by such forces in 1914 if they had then existed. As for the *method*, this was simply a strategic adaptation for armoured forces of the tactical "expanding torrent" attack which I had worked out earlier, at the end of the 1914-18 war.

them. Further armoured divisions were hurriedly formed to expand the small number then existing. A similar effect was produced in America. But in Germany, which had profited so much from the adoption of the theory, victory brought an increase of confidence rather than an urge to further development. Complacency has usually been an accompaniment of victory.

Before launching the invasion of Russia in 1941, Hitler wanted to double the number of his armoured divisions, for moral effect, but as the output of tanks was insufficient he chose the dangerous way of doing it by dilution—reducing the number of tanks in each division from a scale of 300 to 180. That reduction was contrary to the advice of the armoured warfare experts, some of whom considered

"The military author who made the greatest impression on Field Marshal Rommel, and who highly influenced his tactical and strategical conception . . . Rommel could be called Liddell Hart's 'pupil' in many respects."
—General Bayerlein
(Chief of Staff to Rommel in Africa).

that the pre-war establishment of 400 was the desirable figure—one company out of four in each tank battalion had been left behind on mobilization, to provide drafts. Moreover, no substantial improvement had been made in the mechanization of the other elements in the division. The ill-effect of those deficiencies was not very apparent in the opening phase of the campaign, since the Russian Command then was no better than the French in handling its own tanks or in applying suitable counter-measures. But as the Germans advanced deeper the inadequate mechanization of their so-called armoured divisions became an increasing handicap—Russia's poor roads proved a greater obstacle, especially in bad weather, than her tank forces. And as the German divisions shrank, through battle and mechanical casualties, the shrinkage became disproportionately crippling to their punch because their initial strength in tanks had been so limited. In the later stages of the campaign they often entered battle with less than a hundred tanks. It was hardly surprising that

their attacks became decreasingly effective in results—even apart from the development of more efficient methods of anti-tank defence and the growth of Russia's armoured forces, equipped with new and better tanks. It was hardly surprising that their attacks became decreasingly effective in results—even apart from the development of more efficient methods of anti-tank defence and the growth of Russia's armoured forces, equipped with new and better tanks.

It is also to be noted that, in the invasion of Russia, Hitler and the German military chiefs had agreed in putting a check on Guderian's desire to carry out the same kind of deep strategic thrust as he had done in France so decisively. He and the other "panzer-group" commanders were halted in their stride, when there was little to stop them. This top-level check was imposed on grounds of caution, coupled with an orthodox preference for completing the "classical" battle of encirclement. As so often in history, a predominant concern for security brought insecurity that might well have been avoided by audacity. In reflection, many more of the more orthodox German generals came to recognize that the German Army had forfeited its best chance of decisive victory by the veto on Guderian's scheme of driving deep through to Moscow before the defence could rally.

Ironically, the British Army copied the errors of the German in the belief that it was applying the secrets of the latter's success. It would have done better to carry on the logical development of the organized British conception that the Germans had adopted.

Organization Pains

At the outbreak of the war, the British armoured division had comprised six tank units and one motorized infantry battalion—which was too small a foot-fighting element. By the autumn of 1940 this had been increased to three battalions, with six of tanks—a better proportion, though the value of the infantry element was diminished because it was mounted in unarmoured wheeled vehicles. But later the British Army swung too far the other way, under a mistaken imitative impulse. For in 1942, following the Germans' supposed lead, it changed to an organization for the

armoured division similar to that which the Germans had adopted—to their cost—in 1941: reducing the tank units to three while increasing the infantry units to four. This served to ensure that the British armoured divisions would suffer a diminished effectiveness of punch similar to the Germans'. And as the infantry element was not mounted in tracked and armour-protected vehicles, capable of keeping up with the tanks on difficult ground and under fire, the power of the "follow-through" was also handicapped.

Faulty Concepts

The faults of this composition were accentuated by faulty tactics and a mistaken aim, dictated by leaders who had grown up in the old style of warfare. The latter faults had already been manifested in the 1941 campaign in North Africa—then Britain's only field of military action. After the frustration there suffered, criticism concentrated on the deficiency of the British tanks in firepower compared with the German. While the criticism was justified, it was too narrow. For it tended to ignore the way that the consequences of a deficiency in firepower had been magnified by a tactical policy of directing the British tanks to seek out and destroy the enemy's tanks—rather than taking his unarmoured troops or exposed communications as their targets. This tactical policy, on traditional lines, played into the hands of Rommel, who, using his 88mm. guns in skilful combination with his tanks, laid traps for the attacking tanks on the lines I had advocated in pre-war years when urging the development of a new technique of defence. Rommel thereby cancelled out the numerical superiority of the British in tanks, and was able to deliver startling ripostes that turned their advances into retreats. (His repeated success with these defensive-offensive trapping tactics, even in the open desert, demonstrated how the Franco-British forces might have countered the German drive in 1940, and averted the disaster that overtook them.)

Even in 1941 the British had a superiority of force in North Africa sufficient to take the offensive with good prospects of success. But by concentrating primarily on the destruction of the enemy's tanks they not

only made the worst of the main defect in their tanks but missed their offensive opportunity. The same mistake was repeated later. It was a legacy from old doctrine—a doctrine of "pitched battle" which hindered soldiers from realizing that the new mobility offered the means of fulfilling the true ideal of strategy: that of deciding the issue without a serious fight. The mistake was also a legacy from the habits of peacetime exercises wherein commanders of the old school had often begun by trying to cancel out one another's tanks so that they could proceed to conduct their battle on the lines with which they were familiar. Criticizing such a habit, one had pointed out long before the war that "to throw away such a potent piece as a tank force in fighting the enemy tank force is as foolish as for a chessplayer to begin by swapping queens."

When the policy was followed on

"The British would have been able to prevent the greatest part of their defeats if they had paid more attention to the modern theories expounded by Liddell Hart." (1942)

—Field Marshal Rommel

the battlefields of North Africa in 1941 and 1942, the results shook the troops' confidence in their leaders and tactics—the phrase "doing a Rommel" became a common way among them of describing a good performance of any kind. The tactical faults magnified the technical disadvantages of British tank design. A change of policy came late in 1942, when Montgomery took over command. As he wrote: "It had been generally accepted that the plan in a modern battle should aim first at destroying the enemy's armour . . . I decided to reverse this concept and to destroy first the unarmoured formations." This proved fruitful, but its significance was partly obscured by the way that his offensive at El Alamein was confined to frontal attack by lack of an open flank.

Complaint of British tanks diminished with the advent of new tanks in 1942, particularly the American-designed "Sherman," but was followed in 1943 by a renewed depreciation of the tank arm and its place in warfare.

This trend of opinion had developed, curiously, after Montgomery's victory at El Alamein. The fact that the infantry divisions were there employed to break into the enemy's position, and open the way for the armoured divisions, was seized on as a text to "boost" the infantry, and as a pretext to disparage the tanks. The heavy losses which the tanks suffered in slogging tactics following the frontal penetration, and the subsequent failure of the armoured divisions to cut off the remnants of Rommel's army, provided additional arguments for the disparagers of armoured mobility.

During the months that followed, many military voices were again heard crying that the heyday of the tank was past, and that it had declined from a primary to a secondary instrument of warfare. Few paused to consider the question whether the armoured forces had been used to the best advantage. Rommel's own diary comment on his good luck in escaping is more to the point: "As always the British High Command showed its customary caution and little forceful decision. For instance, they attacked again and again with separate bodies of tanks and did not, as might be expected, throw into the battle the 900 tanks which they could, without risk to themselves, have employed in the northern part of the front, thereby using their vast superiority to gain a rapid decision with the minimum casualties."

The Anti-tank Chorus

The "anti-tank" chorus was momentarily silenced by the dramatic collapse of German-Italian resistance in Tunisia following the breakthrough of the 6th and 7th Armoured Divisions, and the decisive stroke of the former in cutting through the neck of the Cape Bon peninsula, thus cutting off the enemy's last bolt-hole. In that drive, riflemen were carried on the top of the tanks, so that they could come into action quickly in clearing obstacles. It was an improvisation that saved much time in bringing up lorried infantry, who would have had to dismount several miles back—but it was a reflection on the continued omission to provide armoured cross-country vehicles for the infantry element in an armoured division—a need one had urged for twenty years.

The slow, slogging advance through

mountainous Sicily and the funnel-like length of Italy revived the chorus. Missed opportunities when the going was favourable forfeited repeated chances of quicker progress, but were not taken into account when the chance came to decry the future of armoured mobility. Moreover, too many believers in it lost faith by the time that the invasion of Normandy was launched. Churchill himself underwent one of his periodical reactions, and in February declared: "We have too much armour—tanks are finished." His doubts were deepened by his military advisers.

The Slow Motion Complex

On a tour of the American forces in England early in 1944, one of the few ardent believers in armoured mobility I met was General Wood, commanding the 4th Armoured Division. But I found him very disturbed—after a high-level conference which had been addressed by Field-Marshal Sir Alan Brooke, Chief of the Imperial General Staff. A keynote of it had been that warfare was "back to 1918," and that lightning drives of the 1940 kind were no longer possible. Wood felt that the American High Command had been infected by this slow-motion view. While pinning his hopes to Patton, who had just arrived in England to take command of the U.S. Third Army, Wood feared that even he might be led to swallow the majority conclusion.

At his urgent desire I went to see Patton. While the latter's obvious dynamism was most refreshing, I was rather disconcerted to find him saying that when the Allied armies invaded France they would not be able to repeat armoured drives like that of 1940, but would have "to go back to 1918 methods." While questioning this, I felt it best to put the contrary arguments in the form of an "indirect approach." He had told me that before the war he had spent a long vacation studying Sherman's campaigns on the ground in Georgia and the Carolinas, with the aid of my book. So I talked of the possibilities of applying "Sherman methods" in modern warfare—moving stripped of impedimenta to quicken the pace, cutting loose from communications if necessary, and swerving past opposition, instead of getting hung up in trying to overcome it by direct attack.

It seemed to me that by the development and exploitation of such Sherman methods, on a greater scale, it would be possible to reach the enemy's rear and unhinge his position—as the Germans had already done in 1940.

This argument seemed to appeal to him—it fitted in with his own mobile instincts better than did the arguments in higher quarters to which he had momentarily acceded. At any rate, when I visited him again in June, just before his army went over to Normandy, he no longer talked about 1918 methods, but on bolder lines. After the break-out from the bridgehead, his army drove from Normandy to the German frontier in super-Sherman style. Wood, with the 4th Armoured Division, was the spearhead of that drive; on reaching the Seine he wrote to tell me how successfully such methods had worked. But

"Liddell Hart—the creator of modern tank strategy."

—General von Manstein
(Panzer Army commander who achieved the Ardennes breakthrough in 1944).

soon after that the momentum of the drive was checked—partly through excess of top-level planning and partly from deficiency of supply due to lack of preparation that was due, in turn, to lack of vision beforehand. Later, Wood wrote: "I feel that we could have done the job more quickly if our High Command had possessed an equal appreciation of the indirect approach." Referring to the Avranches breakthrough, he remarked: "There was no conception of far-reaching directions for armour in the minds of our people . . . nor of supplying such thrusts."

Here we may fittingly conclude the survey of the past that has been made to obtain a projection into the future. What it conveys is that armoured forces have not "had their day"—because, in the real sense, they have not yet been tried.

That may seem strange in view of the way that a handful of German panzer divisions overran Poland, France and much of Russia. But the German panzer divisions were not armoured forces. Nor were the so-called "armoured divisions" which the

Allies used later in the war. The "armour" in an "armoured division" was a small pebble in a large sling. As the war went on the pebble became smaller, but not the sling. While the pebble comprised barely 200 tanks, the sling consisted of about 15,000 men and over 3,000 vehicles other than tanks. The tank regiments accounted for barely one sixth of the total manpower employed in the division. Since the war, the number of tank units has been increased from three to four, both in the British and in the United States Army, bringing the number of tanks up to 280 in the British armoured division and 300 in the American. That increase shows some recognition of a basic lesson of the war. But the sling remains as large as ever.

What is called the "armoured division" today may well be considered a much better striking weapon than the old-style infantry division—but it is not in any true sense of the word an armoured division. That name confuses the issue, and fosters a delusion. It would have been as reasonable, in the Middle Ages, to describe as an "armoured knight" one who had jumped out of bed in his nightshirt and merely pulled a gauntlet on his swordhand.

The disadvantage is all the greater because the so-called "armoured division" has its legs shackled. Some nine-tenths of its vehicles still consist of wheeled transport, more or less road-bound. That has been a growing handicap as the scope of air attack increased, and is likely to become worse. There has also been a multiplication of obstruction from the mining of roads. We have to reckon with the probability that any defence will be based on turning all the road-centres into formidable centres of resistance, so that any possibility of rapid and deep advance depends on our mobile forces being able to by-pass these "hedgehogs." If they have to pause while each of these obstacles is overcome in turn, they will hardly get anywhere before the enemy has assembled his reserves.

The small striking head of an armoured division can leave the road and dart round an obstacle, but the wheel-borne tail cannot. And what an immensely long tail it is! If the division is confined to a single road this means that, at the customary spacing, it would stretch out some 200 miles.

To put it more vividly, if the division was operating on the Continent, the tail would still be near Paris when the head was approaching Antwerp. Where an army is advancing, it is often impossible to allot more than one road to a division—especially in many parts of the Continent where roads are not numerous. Thus a division which is mainly wheel-borne finds its manoeuvring power as restricted as that of a snake wriggling down a drainpipe.

Its present composition also has the effect of limiting the combined striking power of the army. All experience has shown—as theory pointed out long ago—that the best chance of delivering a decisive blow lies in the sudden concentration of a mass of tanks at a weak spot, so that the defence is assailed simultaneously by too many for his anti-tank guns to cope with. That is the method of the *Schwerpunkt*, which the German panzer divisions so effectively exploited in 1940. But they were lucky to find opponents who were very weak in anti-tank guns and had not grasped modern methods of defence.

Heavier Punch Needed

Now the problem is much harder—as later war-experience on all sides showed. The punch must be much heavier if it is to succeed. But with the so-called armoured divisions of the present type it is almost impossible for the concentration to be either massive enough or sudden enough. Each division forms such a bulky coil that even when it is coiled up close there is not room to concentrate many tank-fangs in one sector. Nor can they be concentrated quickly.

If we are to develop adequate striking power we must construct our "mechanical snake" on a clearly thought-out design—reducing the length of the tail and increasing the strength of the head. If we are to give it the power of penetrating deep we must so design it that the tail does not get stuck in a road rut.

Up to now the composition of an armoured division has been based on ideas that were more like a cookery recipe than a scientific design—"take a handful of tanks, mix with a pound of infantry, pour in a pint of artillery, and add a dash of armoured cars." We have even provided several different kinds of artillery unit—as if we

were drawing up the menu at a luxury hotel—instead of trying to design one that would be adaptable to dealing with hostile infantry, tanks, or aircraft. We add something to protect an element that is only auxiliary, and are then led on to add something else to protect the protector—at each step multiplying transport, numbers, supply needs, and hence transport again.

Armor-Air Partnership

Nearly thirty years ago I wrote a treatise on future mechanized warfare and the "Development of a New Model Army," which suggested how this might be achieved in two phases—the first "evolutionary," and the second "revolutionary." In the first phase, the new model divisions would be a blend of tanks with motorized infantry and artillery. In the second, the tank would swallow the older arms, and become the ground-partner of the aeroplane. The mobile divisions would become all-armoured, with the artillery on self-propelled armoured mountings and a smaller number of more skilled infantry carried as "tank-marines" in armoured vehicles. The treatise aroused much interest and discussion abroad, particularly in the German Army, which was then in the melting pot after defeat in World War I. Guderian and others have borne witness to its influence. But there is more significance in what was left undone than in what was done.

For it can be seen that even the Germans never went further than the first phase of that design. That sufficed for the defeat of France. It did not suffice for the defeat of Russia. And as the war went on, "armoured" forces of the existing type became increasingly checked by forces of similar mobility, while finding fewer opportunities of making rings round unprotected foot-marching forces which they could immobilize. That was natural and far less remarkable than the fact that the "evolutionary" phase of the new model had been sufficient to revolutionize warfare to the extent it did in the earlier period of the war. Yet the Anglo-American armies of the later period, when the tide turned, made no serious effort to develop a newer model—despite much superior industrial resources. They were content to batter their way to victory, by sheer weight, along the

old-new lines.

There we remain. Armies and their armoured forces have got into the rut of a fresh orthodoxy. Except for improvements in detail, they are simply carrying on an operational convention that developed from a tentative and partial reorganization which, at the outset of World War II, happened to have a much more striking effect than could reasonably be expected. Armies must get out of this rut if they are to have any important influence in the future—otherwise they are likely to be both paralyzed and supplanted by air-power.

In order to give "armour" a fair chance we have to solve two problems—the break-through and the follow-through. The first is intrinsically the harder. The difficulties of the second are largely due to faulty organization under the influence of conventional thinking.

The Saturation Principle

There are various possible ways still open to us for renewing the break-through power of tanks. Apart from new technical means of paralyzing anti-tank defence which it is undesirable to discuss publicly, we have by no means exhausted the tactical means. Since armoured forces were first introduced into war their more convinced exponents have always insisted that their value essentially depended on their being employed "in swarms—to swamp the defence." It is the principle of saturation—of confronting the defence with many more separate assailants than he can cope with. That principle was fulfilled in the German break-through at Sedan in 1940, where Guderian's corps of 900 tanks concentrated on a frontage of less than five miles in smashing through the successive French positions behind the Meuse. After a penetration of 15 miles in two days against considerable resistance, it was through into open country and the advance became a gallop. Similar saturation tactics were applied on the Aisne in the second break-through, where the follow-through produced the general collapse of the French armies. But the principle was rarely fulfilled in tank attacks later in the war—although its value was freshly attested in air attacks, beginning with the "thousand-bomber raids." The principle should be revived in designing future ar-

moured forces if they are to have any chance of carrying out strokes of the Guderian type, either in the offensive or in the counter-offensive.

The possibility depends partly on the development of tank design and partly on the organizational design of armoured forces. It would be wise to recognize that the present trend of mechanical design towards bigger tanks, and thus fewer of them, is unfavourable to the fulfilment of the principle. We might gain much by a fresh effort to develop a lighter and cheaper type of tank, provided that the importance of obstacle-crossing capacity is kept in mind. That requires length of chassis, but not necessarily bulk or weight in proportion. Such tanks might mount rockets rather than a large-calibre gun—the Germans were going to concentrate on the production of rocket-tanks weighing under 20 tons if the war had continued.

Manoeuvrability Counts

Superior hitting power counts for much in the design of a tank, and even for self-protection is relatively of more value than thick armour; but the power of a body of tanks shrinks rapidly through casualties (battle or breakdown), and the smaller the number of tanks the more severe relatively the shrinkage becomes. Moreover, a superior gun can to a surprising extent be discounted by superior manoeuvrability, especially in a fight between tank formations. A most striking example was the defeat of the Russian drive for the Ploesti oilfields in May, 1944, when the Stalin tanks made their first appearance in battle and gave the Germans an initial shock by opening fire at over 3,000 yards range with their 122mm. guns. Yet, when this battle of Targul Frumos ended, Manteuffel's division of 160 tanks (of which only 40 were Tigers, with as much as an 88mm. gun) had destroyed 350 of the attacker's tanks while losing only ten of its own. Even the small Panzer IVs managed to knock out a number of the opposing "Goliaths," by manoeuvring swiftly under cover of ground to reach their rear, and closing the range—to 1,000 yards.

Although it was the German Army which took the lead in mounting powerful guns in tanks, its most experienced tank leaders emphasize, in the

light of their war experience as a whole, that manoeuvrability is even more important—for quickness in changing fire-positions and shortening the range, for more effective fire. Speed is an essential element in manoeuvrability, but only one element. Cross-country mobility matters more than speed on the road; it might be defined as "loco-mobility," or agility. It depends not only on the performance of the tank itself, but on the tactical ground-sense of the crew and the wider tactical skill of tank unit commanders. When those who have tanks of superior speed and agility dwell on their inferiority in gunpower, the tendency recalls the proverb: "it is the poor workman who blames his tools." The complaint may be justified only where the weapon-inferiority is extreme or the terrain very unsuitable for manoeuvre.

A superiority in gunpower, though desirable, can be purchased at too heavy a price where it results in a loss of manoeuvrability and a reduced number of tanks. Both these handicaps are difficult to avoid with the growing size of tanks—which, in turn, is apt to be favoured by those who find it easier to follow a sedentary style of warfare. The very name of the post-war British "Centurion" tank is reminiscent of the pedestrian and over-laden Roman legionary rather than of the reborn Mongol cavalry idea that gave rise to the lightning style of operations ten years ago. It is time for a reversal of the elephantine trend in tank design, and a move towards the revival of tank-torrent tactics. The development of a new form of motive power for tanks, as well as a new and lighter form of hard-hitting weapon, would increase the prospects.

Tank of the Future

The tank of the future will have to be fitted with night-driving vision and probably with radar, as well as with wireless. It should be able to pass safely through a radioactive belt of country. If we try to combine all these requirements with a powerful weapon and provide over-all armoured protection of adequate thickness, the tank is bound to become an increasingly clumsy monster. The design must be simplified, to produce a mechanical David instead of a Goliath. That may be achieved by external mounting of

the main armament—a rocket-launcher or recoilless type of gun—which should be sighted, fired and fed with ammunition mechanically. The armoured body could then be quite small—a cabin to house the directing apparatus with a crew of no more than three. A new kind of power unit would also help to diminish excessive bulk in the chassis.

Another possibility is the development of remote-control tanks for the spearhead. With crewless tanks there would be no spreading deterrent effect from heavy losses in swarm attacks. It would not matter that a high proportion were knocked out if an effective fraction penetrated the whole depth of the defence—then, the exploitation of the break-through could get going, and might better be carried out by manned tanks, for finer manoeuvring, until another barrier-position was reached.

Amphibious Tank

When such barriers are based on a river, mobile infantry are needed to achieve the crossing. But the scale of foot-fighters actually required is apt to be overestimated, and can often be reduced when and where skilful manoeuvring creates a favourable opening. That was demonstrated in Guderian's forcing of the Meuse at Sedan, where two mobile infantry regiments sufficed to gain a crossing adequate for the passage of the whole panzer corps—although most of the higher commanders had argued that it would have to wait until the backing-up infantry divisions arrived. But the need could be further diminished by the development of new forms of tank-bridging and tank flotation. A vital difference could be made by the advent of a non-specialized amphibious tank, capable of swimming rivers without sacrifice of its general tactical value: and this problem calls for a fresh effort in research.

It can thus be seen that, in the sphere of tank design, there are many possibilities still undeveloped by which the powers of a tank break-through may be renewed. Beyond these are the latest potentialities in the sphere of organization. As pointed out earlier, the chances of swamping opposition are much handicapped because the excessive size of present "armoured" divisions hampers a quick and ample convergence of real ar-

moured striking power at the point of aim. It is difficult to concentrate the tank components of several such divisions on a narrow sector, and produce sufficient intensity of punch at short notice. To make it more possible, it is essential to cut down the other components in the division, thus raising the tank ratio.

As Manteuffel put it—in referring to Hitler's fatal decision on the further dilution of the German armoured divisions prior to the invasion of Russia—"The armoured division thus lost the impetus and penetrative force of its tank core, whereas everything should have been done to strengthen it. The pace of an armoured division's attack and much else depended now on the infantry—which was wrong. . . . An armoured division can only be strengthened by reinforcing the tank core . . . for it is that which invests it with the impetus necessary for attack." "On the basis of my long experience in practical service with troops in the war I fully agree with your opinion that the tank core can never have too many tanks, and that this is possible without rendering the 'tail' too heavy or unwieldy. I would warn everyone of the fatal disproportion between the number of vehicles in the combat echelons and the supply vehicles."

Fighting Mounted the Thing!

The "armoured division" has become more of a misnomer since the title was adopted in 1938 in place of "mobile division." Indeed, it is only a mobile division in the strategic sense, not in the tactical sense. The essential tactical idea of such a division is that of *fighting mounted*—to retain its impetus—as the cavalry did in the days when they played the decisive role on the battlefield. While the inclusion of men who can fight on foot is a tactical necessity—for dislodging enemy troops under cover behind obstacles, and for various defensive duties—it is a fundamental mistake of organization if the proportion of such "mounted infantry," dismounting to fight, exceeds or even equals the proportion that fights mounted, manning tanks and self-propelled guns (on tank chassis). "Armoured fighting men" should be preponderant in an "armoured division" if this is to justify its name and fulfil its proper purpose.

At the same time the foot-fighting

element ought to be entirely carried in tracked vehicles, armour-protected, so that they have a cross-country mobility and manoeuvrability equal to the armoured fighting units. That is essential in order that they can back up the tanks closely and come into action immediately they are required, to clear defended obstacles in the path of the tanks. Moreover, the quicker they can intervene, the fewer of them will be required—that is a matter of com-

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mon experience in warfare. A company of such true "tank-marines" could often brush away opposition that a whole lorried battalion or more could not overcome an hour later, when the defending infantry have been reinforced by local reserves. The time-factor rules warfare.

A further reduction in the size of the foot-fighting element in the division might be obtained by the use of airborne troops, especially if the means of using these is improved and developed. In discussing the Ardennes offensive of December, 1944, Manteuffel emphatically agreed with what I had written at the time about the way that airborne troops could have been used to seize the awkward defiles in the Ardennes ahead of the tank advance. He considered that they might have made a decisive difference to the

prospects of an early break-through and "unlocked the door." In his reflections on the lessons of the war he has advocated that airborne troops should form part of all large armoured formations.

This brings us to the problem of the follow-through—which is, by comparison, simpler than the problem of the break-through. The basic conditions of a solution were epitomized in the definition of *blitzkrieg* set forth earlier in the chapter. *Pace with variability is the secret of mobility, and sustained momentum, in the follow-through.* But much depends on the development of technical means and the elimination of superfluities.

In the Sherman Spirit

Armoured forces must move light, be able to operate self-contained, and develop more capacity to cut loose from communications—in the Sherman spirit—if they are to attain the degree of offensive mobility required for a decisive follow-through. The Germans went a good way towards this strategic ideal in 1940, but were greatly helped by the fact that the Allied armies were easily paralyzed as well as too rigidly rail-bound. It is no longer possible, for us at any rate, to count in future upon having opponents so susceptible to paralysis. And if we cannot cripple them in this way we shall run the risk of breaking our arms in striking—unless we can kick off our clogs and slip round their guard. Air transport offers one means towards greater freedom of movement and manoeuvre. Cross-country transport offers another. The drastic reduction of impedimenta is a third. All these potentialities should be more fully explored and exploited.

The "armoured division" today is too much like an inverted turtle—with a small armour-clad head popping out of a huge soft-skinned body. This is so unwieldy and such an inviting target for air attack that its mobility is too easily turned into immobilized vulnerability. The unarmoured elements should be cut down to a minimum. So should the road vehicles. The maximum possible proportion of the infantry should be airborne. What is moved on the ground should be track-borne rather than wheel-borne. Supply to such mobile forces should be as far as possible by air transport rather than by land transport.

ARMOR—May-June, 1951

DON'T JUMP TO TANKS

by LIEUTENANT COLONEL WILLIAM R. KINTNER

DURING the first critical summer days of the Korean war, marked by the long retreat back to the Pusan bridgehead, the Soviet-made T34 tanks used by the North Koreans were a formidable menace. The impressive gains made by the North Korean tanks inspired considerable criticism of our Army's armor. Now that this particular "tank crisis" has passed we are in danger of not weighing these enemy successes with balanced judgment and concluding that this country's security requires tanks—tanks out of all proportion to their value to us. We like a simple answer to our military problems, and we know that American industry can turn out a lot of tanks. But let's not jump to simple conclusions or too many tanks. The first waves of Red tanks which rumbled across the 38th parallel had a heyday. None of armor's archenemies was available to the defense at the time these Red tanks chalked up their big gains. But once these enemies made their appearance, the invading tanks lost their effectiveness on the battlefield and their space in American headlines. The natural enemies of the tank form an air-ground weapons system comprising the land mine, the bazooka (with the shaped-charge warhead), artillery, the rocket-firing aircraft, and engineer units equipped to neutralize or destroy paths suitable for tank travel. This system developed with surprising speed in Korea and once it became effective, the T34 lost most of its potency.

Exploiting surprise, the North Korean Reds routed the poorly armed Republic of Korea forces. The chaos and disorganization of retreat left no time to sow minefields, demolish bridges or devise tank traps. U.S. units hastily thrown into action were not fully prepared to withstand the ar-

mored attack. There were obvious deficiencies in training and equipment.

None of the elements of an effective antitank weapons system was initially present and the rolling hills of central Korea became tank highways rather than tank traps.

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In the resentment against our repeated losses, the significance of our tankless forces in the field struck the American people and a hue and cry arose for tanks and more tanks. Many of the Army's armor advocates led the swing with the axiomatic statement that the best antitank weapon is a tank. Even if the matter were limited to the issue of stopping a single tank, this appears highly questionable. The outcome of a tank duel would to a

large degree depend on who fired first. It could depend on the tactical situation as well. A tank on the defense, in a dug-in position, for example, has an advantage over an attacking tank that must silhouette itself against the skyline as it seeks out its opponent. This same advantage accrues to the more mobile and less expensive bazooka, utilizing cover and concealment to balance its lack of armor.

We are less concerned, however, with the variety of means available to stop a single enemy tank than with the place of armor in the American military machine. How much of our defense appropriations should be earmarked for armor in view of our strategic commitments abroad? What is the future of armor in the years immediately ahead?

Are tanks the new cure-all for American security that they might have first appeared as we looked over our shoulder at Korea? Before reaching a conclusion, let us briefly examine tank warfare in World War II and then analyze our strategic position in the present unstable world of today.

In France, General Patton's tanks wrote some glorious pages in the history of mobile warfare. Their magnificent dashes electrified the whole world, but these end-runs did not take place until after the German front had been shattered. In July 1944, Patton's sweeps began when enemy aircraft had been almost entirely driven from the skies and enemy artillery, thinly spread over two massive fronts, was constantly under attack by our Thunderbolt fighters. The breakthrough opened rout conditions which permitted no time for German mining or demolitions. Further, the terrain of northern France was tank country; in fact, it was the birthplace of the tank.

The spinning wheel of war succes-

sively brings varying combinations of fire power, armor and mobility to ascendancy. In the brief history of the tank, which has followed this cyclic pattern, Patton's epic brought the tank to the top of the wheel.

Earlier in World War II, German tanks had previously been highly effective against the Allies in France and the Low Countries. But the lessons of the German penetration of the hinge of the Maginot Line was eventually digested by the world. Guderian's blitz was concocted of a balanced combination of tanks and aircraft ideally designed to exploit the transient technical advantage then possessed by armor over fire power.

Against the Soviets, on the other hand, the German armor did not fare as well, especially after the force of the opening aggressive thrusts had been exhausted. It is true, of course, that the panzer divisions made important advances before the Soviets developed materiel and antitank tactics to cope with them. Eventually the Soviets deployed their armies in depth on a massive scale forming the land-island defense system, each island strongpoint almost an army in itself and self-contained. As the Soviet defenses and armor improved, the power of the panzer divisions declined. German armor was able to thrash around in the never-never land between these islands, but was subject to repeated losses all out of proportion to the damage inflicted on the Red forces.

Tanks in the desert played a crucial role. Yet estimates of their value changed almost as rapidly as shifts in the desert war's fortunes between the Afrika Korps and the Allies.

"Tanks Are Finished"

As a general rule tanks used in the jungle and in mountainous terrain were a relatively unsuccessful and unimportant factor. In fact, Churchill summed up their poor showing in Italy with the flat assertion, "Tanks are finished." This verdict seemed borne out in the subsequent Normandy battle by the failure of British armor to make ground at Caen. Then came the breakthrough and Patton's dash across France. Armor had made good. The misfortunes suffered during the ensuing winter might have erased this opinion had not the final campaign in Germany been so brilliantly sparked by U.S. armored divi-

sions.

Three facts stand out in assaying the triumphs of U.S. tanks in World War II. They generally were superior in mobility and control but inferior to German tanks in armor plate and guns. Secondly, our tank gains were always made under the protecting umbrella of decisive superiority in tactical air, which often overwhelmed enemy tank defenses. Finally, opposing infantrymen did not possess bazookas or weapons firing shaped-charge shells. Nor were those weapons featured in the defense of France in 1940 or in the seesaw tank battles of the desert. The role they might have played in these battles and against us in our victorious march across France and into Germany cannot be assessed.

Stopping the Tide

Against this survey, let us measure America's requirements for tanks at the present. We're not a nation dedicated to making aggression, but a country dedicated to a world-wide defense against it. We are not planning a surprise attack of hostile lines through which to release hordes of rampaging tanks. If total war replaces limited war, what we will need on land is a means of stopping the tide, the huge Red tide of armor and infantry which may move against us. We must hold this tide from engulfing many peoples all over the world who are not only our friends but our essential allies, all of them needed if we are to win the great struggle. This calls for weapons which can meet the requirements of an initial defense against the vast infantry-tank forces of the enemy. Thousands of relatively inexpensive and highly mobile weapons will be needed to meet this vast world-wide demand. Whatever their individual design, they must collectively comprise an effective antitank weapons system.

Let us look at how such a weapons system might operate. Larger bazookas using the latest ammunition—rockets with shaped charges—are lethal at short ranges. In the hands of experienced soldiers with the ability and daring to close the range, these bazookas will make it unprofitable for tanks to forage alone where they cannot be protected by cross-fire of their brother tanks, or through overgrown country where the bazooka can lurk behind trees, hedgerows or hillocks.

When massed in open country to protect themselves from the depredations of the bazooka, enemy tanks will fall prey to flexible artillery concentrations and flights of heavily armored, rocket-firing aircraft. If the battle terrain makes them road-bound, they will be stopped by demolitions, mines, and tank traps.

Will this combination of weapons hold armor at bay? It looked for a time as though the T34 type tanks of the North Koreans were impervious to the bazooka, but the 3.5-inch model quickly exploded this fallacy. The dramatic rush of these weapons to the field only emphasizes the fact that we cannot be lax in forging more effective weapons for the system needed to keep armor chained.

The shaped-charge shell is a nightmare to the world's designers of armor. It can be delivered not only by bazooka, but by artillery and rocket-firing aircraft as well. This effective refinement in the design of the projectile concentrates the force of the explosion in the desired direction, rather than having it expended in all directions equally. It represents a threat to armor which can only be met by much heavier armor plate than any now employed. While the effect of even this projectile can be lessened by inclining the surface of the armor to effect a glancing impact, such inclined surfaces cannot be presented to all projectiles fired frontally, from a flank or from the air. Improved resistance to the penetration of these projectiles might be made by expensive processes which harden the steel surfaces, but at this stage of technical development, the race between explosives and armor seems one-sided. The methods of delivering the explosive forces that man has created have already far surpassed the protection that can easily be afforded by armor plate.

The Foreseeable Future

From this we must conclude that in the foreseeable future, tanks will either be extremely heavy, expensive, road-bound, and slow or not really tanks at all but virtually personnel- and weapons-carriers, providing protection only against small-arms fire.

Fortunately, the weapons system we have briefly described fits the global requirements imposed by a strategy of initial defense. Land mines and demolition equipment are relatively inex-

pensive and simple to emplace. They are easily transported overseas and can be stockpiled near where they are likely to be used. In contrast to the tank, weapons such as these, if captured by an enemy overrunning our position, could not be transformed into a two-edged sword and used effectively against us while we are on the defensive. The more expensive items in this system such as self-propelled artillery are highly mobile and can be kept in reserve to meet major threats as they develop. Because of their high mobility, unarmored artillery pieces are less susceptible to capture. These are the type of ground defensive weapons that we need now and should concentrate on obtaining in quantities.

Tactical Air

The nature of America's armor program must be considered in conjunction with our over-all requirements in tactical air. If we are ever to meet the massed manpower of the Communist empire on anything approaching an equal basis we will need to develop tactical air power far in excess of that available to our forces in Korea. For the initial defensive phase of any future conflict the Army's weapons must be designed to contain the enemy's armor tide on the ground while tactical air delivers the Sunday punch from the sky.

Command of the air is still an essential prerequisite of victory for our forces. (It should be obvious by now that the ratio of our divisions to those of the enemy must also be greatly improved.) Without a guaranteed command of the air, our entire military position will crumble. Yet we cannot simultaneously support a large tank program and a vast tactical air development program. At this critical moment, we should accelerate the production of rocket-armed aircraft capable both of fighting for mastery of the skies and of blasting enemy tank columns before they reach the line of contact. Assigning a relatively low priority to armor is the other side of the tactical air coin.

The expensive tank (in terms of labor and materiel) must wait until our operations are more nearly ready to use them. Then they can be of the latest style, less vulnerable to the weapons that are lying in wait for them, and specifically designed for the locale where they are to be used.

We do, of course, need tanks today for infantry divisions and armored units already in existence or proposed for early mobilization. These units are designed to use tanks which give them the balanced power needed for tactical flexibility in the defense. But the vast numbers of tanks we may find necessary for a great land offensive should not be bought today. Ample time to manufacture these does not exist. Time can be found for the protracted build-up (a necessary prerequisite to the launching of such an offensive) only if we find means to stabilize the initial defensive line. To build vast numbers of tanks now would be to deny our allies the defensive weapons they so sorely need, and to perpetuate our present critical shortages of tactical aircraft and artillery and bazookas.

American industry has the capability of turning out a lot of armor, but the manufacture of a large number of tanks, particularly with industry not geared for full-scale war production, would deprive us of more urgently needed munitions. For every unnecessary tank and its crew we should substitute a rocket-firing aircraft and pilot.

To match the 40,000-odd tanks marshalled by Communists would require hundreds of thousands of men to man them and more to support their effort. Even if we tried to make the tanks and recruit the tankers we would not be able to use them without putting a lot more coal on the fire. Tanks are not flown across oceans as are tactical aircraft; they are not loaded as easily as artillery and bazookas. They have to be deck-loaded on most vessels, which can carry only a few. Their large-scale employment would step up our bridging requirements. It would require a great effort to place them where they could be used. They would also necessitate a very sizable effort to resupply them for they expend great quantities of POL and ammunition.

Cut Away His Strength

In a possible war, we will be competing with an enemy who is fighting on interior lines of communication, using relatively short land hauls for resupply instead of transporting it across oceans. A large-scale armored program would result in our playing the enemy's game with the cards stacked against us. It would be an endeavor

of containing him tank for tank rather than skillfully cutting away his strength.

The tank may be an ideal tool for an aggressor. With tanks the aggressor can come thundering into battle against weak forces with no warning when and where he chooses. He will employ them in that way, unless he is opposed by an antitank weapons system capable of blocking this type of power play.

Because the tank is primarily a weapon of the offense, and its use on the defense is greatly limited and extremely expensive in comparison with other weapons, tanks do not represent the same dividends for American priority-conscious defense dollars.

Tomorrow's War

But even in recognizing its value on the offense, let us also realize that the speed of offensive warfare is ever increasing and threatens to leave the tank, as we know it today, far behind in rapid attacks of the future. Airborne troops permitting the strategic encirclement and by-passing of strongpoints, may mean more than tanks in tomorrow's war. The tank and antitank requirements of airborne forces approximate those of Western armies today. Airlift to haul heavy tanks into the landing area does not exist; yet enemy tanks represent the greatest single hazard to an airborne operation. The period between the initial drop and the establishing of a solid perimeter defense is the most crucial phase of the airborne battle. This initial defense, like the initial strategic defense of the free world, must be compounded from a successful combination of rocket-armed fighters in the sky and lightly but powerfully armed soldiers on the ground. Hence, successful airborne operations may emerge from the same combination of weapons now required to safeguard the free world from Communist armor.

To summarize: A major tank development program at this time would conflict with the more essential tactical air program; would impose added burdens on overloaded logistical supply lines; could not overcome the immense Soviet armor lead; would interfere with the rapid arming of our allies and run counter to the current armor-vs-fire power trend.

So let's take another look before we jump to tanks.

SOMETHING TO STOP A TANK

by COMMODORE DUDLEY W. KNOX

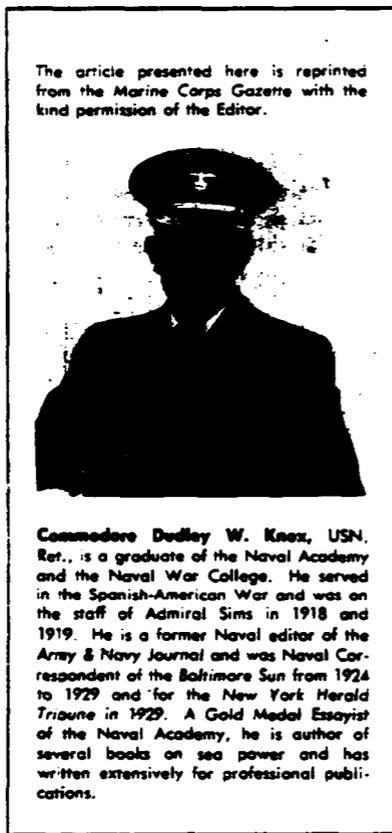
CURRENT experience in Korea confirms a primary lesson of World War II. Infantry must have good tank support if it is to cope with tank-led troops. According to well qualified American and British experts, the support of artillery and air is not enough, and the best, if not the only satisfactory antitank weapon is another tank.

What then is to happen if the dreaded World War III materializes? The Russians are reputed to have upwards of 100,000 tanks already existing, and to be building 1,000 per month. This may be 10 times the corresponding figures for the democracies. Can we ever catch up with the Russians and have enough of our own tanks with which to beat theirs? Obviously, not for a good many years and at enormous cost. Meanwhile does it not seem imperative that we bend serious efforts towards developing something else besides tanks with which to stop tanks?

Prior to America's entry into the last war, German tanks ran rampant through Poland, Belgium, and France, revolutionizing the pattern of land warfare. They were the decisive element in spectacular victories giving Germany complete control of Western Europe. At this stage, the present writer advanced the theory to his valued friend, Maj. Hoffman Nickerson, that, properly used, the gun was the answer to the tank; that shore artillery was not accurate against fast moving targets, because of unsuitable methods of fire control; that the naval system of fire control should be adopted ashore in order to hit moving targets at long range.

Nickerson took my casually made suggestions seriously. By his kind initiative, together we called on a colonel of high reputation who had just returned from Europe, where he had observed the new tank warfare. After several weeks of study the colonel decided against my proposals. His main

reasons were that beyond 1,000 yards tanks were seldom good targets for artillery, and that at that distance, or less, the point-blank range made fire control unnecessary. My adventure in tank warfare seemed to be at an end!



The article presented here is reprinted from the Marine Corps Gazette with the kind permission of the Editor.

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However, some corroboration of my contentions came in July, 1943, when the Navy put ashore our assault on Sicily. This was of course accompanied by the customary support with naval guns after the troops had landed, and until they were well established. During the first two days the greatest menace to the beachhead at Gela was repeated attacks by some 60 German tanks, including those of

the "tiger" variety. In repelling these, naval gunfire played the decisive role.

Naval fire control first proved its worth against tanks on 10 July, and at ranges from 10,000 down to 5,000 yards. The destroyer *Shubrick* had spent the hours of darkness in firing against shore batteries, and their searchlights, while doughboys poured ashore. At dawn, with other vessels, she came under the fire of shore batteries and was also subjected to a long series of air attacks. Defensive measures, as usual, included maneuvering at high speed; that is, making frequent radical changes of course, such as circling and moving in figure-of-eight patterns. In addition, naturally, the ship was rolling and pitching. It was while subjected to such violent and irregular motion in several planes that the firing was done against rapidly moving tanks. How forsaken would the shore artillerist feel if the gun he was firing was so tossed about! What could he hit at a range of 10,000 yards, with the target also in rapid motion?

Soon after daylight, the *Shubrick's* shore fire control party reported a concentration of 25 tanks moving toward Gela, and called for indirect fire against these targets, invisible from the ship. Initially the range was close to 10,000 yards. After a few ranging shots, the destroyer opened with four-gun salvos from her five-inch guns. The procedure was to fire salvos rapidly (about 10 per minute) for several minutes; then pause for reports of error from the shore spotters; then several more minutes of rapid-fire salvos; then another pause for corrections, and so on. What was the result? Six or seven tanks ran the gauntlet to Gela, three were knocked out completely by hits, the other 15 were too damaged or too scared to continue in action. Thus about 70 per cent were put out of action. All this at ranges from 10,000 yards down to 5,000-6,000 using indirect fire, the tar-

get not being visible from the fast maneuvering ship.

During that and the succeeding day, naval vessels broke up four more tank attacks on our troops in the Gela beachhead. They were credited with destroying 12 tanks in all. The cruiser *Boise* destroyed four "tigers" with her six-inch guns. Her indirect fire at ranges up to 18,000 yards was reported by the shore fire control party as being very accurate and effective; when hit, a tank was "ripped apart," they said.

Now, a naval gun is not more accurate than an army gun. Equally, both of them are instruments of marvelous precision that can be counted on to hit what they are well aimed at, within incredibly small limits of error. For centuries shore artillery has been blessed with the simple problem of firing from a stationary position at a practically stationary target. The fire control solution is correspondingly simple. Naval fire control, on the other hand, from necessity has had to be very complicated. Two ships steaming at 35 knots directly toward each other have a rate of approach of over 80 miles per hour. Yet naval fire control methods can provide for this and keep guns hitting frequently at 30,000 yards range. Although tanks are much smaller targets, their speed in battle rarely exceeds 25 miles an hour. It should not be too difficult for a stationary shore gun to make a good score on a moving tank at 10,000 yards, and more, given a fire control system that will aim it accurately. Certainly a concentration of tanks could be hit often.

Gun Most Effective

No other antitank weapon can compare with the gun in potential effectiveness. Aircraft, using bombs or rockets, hit a small target only with great difficulty, even at low altitudes. At moving targets their inaccuracy is greatly multiplied. Land mines are weapons of pure chance. Bazookas, flame-throwers, and similar devices for employment by foot soldiers are of such short range as to be useless except as a last resort when tanks have already broken into front lines. The soldier is then at a critical disadvantage, since he must fight against the withering machine-gun fire from behind the protection of armor. Tank formations should of course be stopped

if possible long before they reach close quarters with our infantry. This is the task of artillery, primarily. Nothing else seems so well suited to it.

Another Tank

The writer is aware that the foregoing is out of harmony with the current concepts of American and British tank experts. A leader among them, Gen. Devers, explains the accepted view in a recent interview in *U. S. News and World Report* (July 21 1950 issue). The basic assumption therein is that "another tank" is the best and virtually the only certain means of stopping hostile tanks. The August 25, 1950 issue of the same magazine carries an interview with the celebrated British authority, Gen. J. F. C. Fuller. He too maintains that "The best antitank weapon is another tank." But, mark well that he adds "And tanks have to be supported with self-propelled guns." Other experts have given emphasis to the need of artillery support as a secondary matter, but all seem to be unanimous in their advocacy of "another tank" as the main reliance against hostile tanks.

When the concept of stopping a tank with "another tank" is analyzed, it boils down to a matter of artillery. The idea is that the "stopper" must have a powerful enough gun to penetrate hostile armor at about 2,000 yards, and kill the enemy with gunfire. That is a cardinal predicate; the basic element is tank design around which everything else must be built.

Since potentially hostile large tanks carry a heavy front plate of armor nearly 11 inches thick, we must mount at least a 76mm gun to pierce that plate. Our own tank will similarly have heavy front armor. But neither the enemy nor ourselves can afford to put heavy armor all the way around; sides, back, and top can have but light armor, otherwise the monster would be too heavy to move; and about 35 miles speed under favorable conditions is needed. All this for the 25-ton type of tank.

In general features the result is merely a gun surrounded by armor, mounted on a self-propelled carriage, also armored. Performance in the way of loading and firing rapidly must be handicapped by restricted internal spaces. Although the gun itself is capable of great accuracy at ranges of

10,000 yards and more, it has been encumbered with heavy armor in order that it may be taken into battle ranges of 1,000 yards and less. Would it not be more logical to reduce the armor substantially and shoot from the longer ranges, and shoot faster? This of course assumes that a system of fire control will be used that takes fast moving targets into account as a cardinal consideration.

Tank specialists will object that long-range fire will not be effective enough because the 76mm gun cannot penetrate 11 inches of armor at more than 2,000 yards. Such objection is not conclusive for several reasons. The weight saved from shedding armor can be put into a bigger gun, capable of sufficient penetration at long range. But even the light gun which hits often will kill by going through the thin parts; top, sides, and sections near the ground. At long ranges the soft sides will often present a good target, since the attacker cannot always keep himself head-on when traveling through a long distance. Moreover, some of a group of laterally dispersed defending guns are bound to have a side for a target. Finally, there are several varieties of tanks that do not carry heavy armor.

Naval Fire Control

My understanding is that the principles of naval fire control against moving targets have already been applied to the self-propelled gun, which is thus prepared to serve as a tank "destroyer" at relatively long ranges. The rejection of such a gun as the best answer to the tank seems to be based on (1) the smallness of the target presented by an individual tank, and (2) the difficulty of seeing camouflaged tanks under many conditions of terrain.

Both of these objections admittedly have merit, especially as they apply to a small number of tanks. But our big problem is how to stem the onslaught of hundreds of thousands of tanks on the terrain of western Europe. Under such conditions the objections mentioned scarcely seem valid enough. At any rate the problem of overcoming them with guns should be far easier to solve than the alternative puzzle of how to create enough tanks on the European front in time to beat mainly with tanks the horde of enemy tanks. It seems to be clearly the part of wis-

dom for us to develop to the maximum the undoubtedly very great potentialities of the gun as a primary answer to the tank.

Granting the extreme accuracy of the gun itself, and assuming an excellent system of fire control to handle moving targets, there will remain the matter of spotting as the weakest link and the most difficult one to strengthen. A variety of novel devices, such as radar beacons, are already available to aid in the solution, and our amazing scientists no doubt are able to develop others, if set the task. There is also room for much improvement in the rapidity of fire of land artillery. This can be of great importance. Once shots are reported as hitting, a speed-up of shooting will be exceedingly profitable.

Destroyers vs. Tanks

During the late war, the Navy had a tremendous amount of experience in bombarding shore targets. Much of it was against inland objects not visible from the ship and consequently needing expert spotting for effectiveness. Special attention was therefore given to the training of spotters and to their close integration with the gunnery elements of the task. We have seen how naval cruisers and destroyers broke up tank attacks at Gela, Sicily, in 1943. There was no luck or magic in this. It was a pay-off of a long period of daily intensive drill prior to the operation. Each ship had its own shore fire control party with which the drills had been conducted. Provisions had also been made for spot-

ting from airplanes, and the naval aviators similarly trained, but in the ensuing battle the small ship's planes had no fighter protection and were soon driven down. They reported the tanks but could not keep the air long enough to spot gunfire against them.

An excellent article, *Gunfire Support Lessons Learned in World War II*, Comdr. McMillian, appears in the *Naval Institute Proceedings* for August, 1948. The high importance of thoroughly well trained ground-spotters is made clear. Upon many occasions, however, the shore fire control parties were unable to direct fire because of targets being out of their sight. It was then necessary to use airborne spotters. Therefore "a trained pool of aviators qualified to control the guns of fire support ships" was regularly maintained. McMillian points out that "These naval gunfire air spotters (pilots) must be trained to appreciate the ground forces' problem and to recognize front lines and profitable targets. They must also be trained to appreciate the problems of fire support ships, to be familiar with their ordnance and ammunition, and to understand and use the proper spotting procedure and method of conduct of fires."

The foregoing blazes the trail for the effective use of the self-propelled gun against tanks in land warfare. In essence that trail is primarily one of integration of all the elements in the problem. The participating artillerymen, tankmen, and airmen must be much more than merely "unified"; they must be integrated under a single

control. That is the Navy and Marine Corps way and no other will work efficiently. Since artillery and tanks are both a part of the Army, the establishment of single control over those parts of the team should be simple. The essential integration of the Air Force component, however, seems to pose a special difficulty because of the recently won independence of the Air Force from the Army. The writer is not prepared to suggest a method of overcoming this organizational handicap.

Integration Needed

But he is thoroughly convinced that it must be overcome if we are to be made ready to stop the overwhelming horde of Russian tanks. Self-propelled guns can be made indispensable in doing this if all the personnel connected with their use are integrated into one team, under single command both for training and operations. It seems futile to consider the alternative of relying primarily upon our own tanks to stem the Russian tide. How can we expect to get enough tanks in the field in time, even if the national economy could bear the burden?

Naturally, the self-propelled gun, even when fully integrated with ground and air spotting, should not be relied upon alone. It will need to be supported by and coordinated with antitank efforts by our own tanks, as well as by and with our own combat planes. The galaxy of all these must again be well integrated for the maximum results. "Unification" is not enough.

DELIBERATIONS ON ARMOR

by LIEUTENANT COLONEL FRANK F. CARR

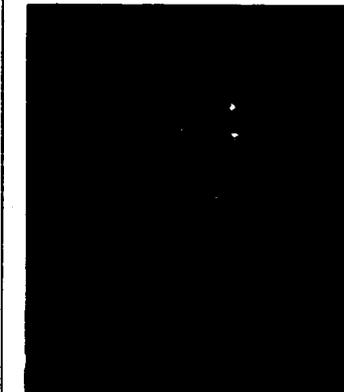
THE Korean campaign has, once again, focused the eyes of the military world on that ergoma of the battlefield, the tank. The tank has been lifted from the methballs, its plastic cocoon removed, and it is now being examined with a critical eye by both the layman and the professional. Fortunately, such scrutiny is not new in the life of this weapon and so it will, undoubtedly, survive without too much embarrassment.

The "Billy Mitchells" of the armored force are now trumpeting that the tank is the decisive ground weapon of the battlefield; that the tank dominates the battlefield; and that without it the infantry can neither advance nor defend itself against an enemy who possesses and uses this weapon. As an example, they point to Korea and say, "We were dominant on the sea; we had complete superiority in the air; terrain was favorable for defense and delay; but still the enemy advanced. Why? Because he possessed and made use of his tanks to such an extent that the hapless South Korean and United Nations' forces could not stand against him."

How much truth is there in these statements? What is the role of the tank in the ground force team?

With the tremendous increase in the number of tanks organic to the present infantry division as compared with the World War II division, and the corresponding increase in the number of tanks found in the type corps and field army, it is vital that commanders and staff officers have an understanding of the capabilities and limitations of this weapon and how it should be employed. How vulnerable is the tank to enemy gunfire? How mobile is the tank? Should it be employed in mass? Is the tank, as the early stages of the Korean campaign seemed to indicate, the decisive

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Lt. Col. Frank F. Carr served with the 1st Armored Division during World War II, in assignments including command of the 1st Battalion, 13th Armored Regiment, and the 4th Tank Battalion. Following a period as division G-3, he returned to the States to attend the Command & General Staff College. After a brief assignment as Test Officer in the Weapons and Ammunition Section of AFF Board No. 2, he returned to the Command & General Staff College in late 1946 to take up his present assignment as instructor.

ground weapon of the battlefield? These and many other questions are being asked by officers, with and without armored experience, who sincerely wish to know what to expect from their tanks.

The purpose of this article, then, is to consider briefly those areas wherein the greatest amount of confusion seems to exist; to discuss a few of the capabilities and limitations of the tank; and to examine some aspects of its employment in the infantry division.

In Korea, the tank, skillfully used by the North Koreans, did prove to be the decisive weapon on the battlefield for the greater part of the campaign. It was not until the United Nations' forces obtained tanks in

comparable numbers that the lines began to stabilize. Thus, the obvious conclusion can be drawn that the tank proved to be decisive, in the early stages of the Korean battle, only because one side possessed a superiority of tanks while the other side had no effective means of countering this superiority. To follow this reasoning to its logical conclusion, then, would not the same have been true if the South Korean Army had had plenty of tanks but little or no infantry, or if they had had an abundance of infantry and tanks but little or no artillery? The answer should be obvious.

Tanks, infantry, and artillery, then, are all decisive on the battlefield and must work as a co-ordinated team to achieve victory. In any given engagement, however, usually there will exist certain specialized conditions which will permit or require the dominance of one of these arms over the others to ensure the defeat of the enemy. Thus, in the deserts of Africa or on the plains of North Germany the tank may predominate; while in the mountains of Italy, infantry and artillery will have the dominant role. But no matter what the conditions may be, or which plays the leading role, the other two have vitally important supporting roles which are necessary for the success of the campaign or battle.

Now that we have placed the tank in its proper perspective with relation to the other major elements of ground combat, it might be well to digress for a moment to consider briefly the future of the tank. There are many who consider that the latest developments in scientific research are sounding the death knell of the tank in much the same fashion as was done for the horse. To date, however, no such developments have been revealed. Pending their development, it is probably safe to assume that as long as there are requirements for mobility, maneuver-

75th ANNIVERSARY OF LITTLE BIG HORN

June 25th will mark the 75th Anniversary of the Custer Massacre on the Little Big Horn during the campaign of 1876. The day will be marked by appropriate ceremonies on the battlefield. General of the Army George C. Marshall, Secretary of Defense, and Lt. Gen. Albert C. Wedemeyer, Commanding General of Sixth Army, are scheduled to be speakers at the observance on the historical site near the present-day town of Hardin, Montana.

At Little Big Horn, General Custer and 225 officers and men of the Seventh United States Cavalry were annihilated by some 5,000 Indians.

Custer Battlefield National Monument on the site of the battle a dozen miles south of Hardin will be the scene of a program on the morning of June 25. General Wedemeyer will deliver the major address there. General Marshall will speak at a banquet in Hardin that night.



Armored Division, General Antine & Film Corp.
Gen. George Armstrong Custer

ability, and armored fire power on the battlefield, there will exist a requirement for tanks. And as long as the infantry exists, there will be requirements for such maneuverability, mobility, and fire power.

Weapons of the atomic age which may render infantry, artillery, as well as tanks obsolete conceivably may be developed in the future. Pending the arrival of such weapons, we can predict that there will be no material change in warfare as we now know it.

The Weapon Itself

Now, with the immediate future of the tank temporarily secured, we can turn to a closer examination of the weapon itself.

The use of the M46, the tank organic to the infantry division, like all tanks, is influenced by certain types of terrain which restrict or prohibit entirely armored operations. Likewise, its effectiveness is limited by certain types of enemy defensive works such as antitank (AT) ditches, obstacles, and extensive mine fields. Like all other vehicles, its effectiveness may be impaired by improper maintenance, and by a lack of logistical support, particularly fuel to run it. Finally, it is vulnerable, in varying degrees, to enemy fire both from both the air and ground. Our discussion will cover only this latter grouping—the vulnerability of the tank to enemy fire.

How vulnerable is the present M46 tank to enemy fire? In general, it can be said that the only way to stop effectively large numbers of tanks is by means of other tanks, thus giving rise to the saying that, on the battlefield, "armor attracts armor." If that is true, then what about artillery, aircraft, the AT gun, and the rocket launcher (bazooka)? The answer is that, although these weapons possess the capability of stopping tanks, they all require certain specialized conditions which are favorable for their effective use. This is not true of other tanks. Where our tanks can go, so can the tanks of the enemy.

Artillery.—What are the limitations of artillery when employed against tanks? Light artillery (105-mm), employing indirect fire techniques, generally is ineffective against even the World War II Sherman tank. This is true because of the difficulties of obtaining a direct hit against a moving

target, and because of the low explosive power of the weapon's projectile which is not great enough to injure the crew or seriously damage the tank even when a direct hit is obtained. Fire from light artillery should not cause a medium tank to change its general position nor should it slow its advance. The exceptions to the above are: a direct hit through an open turret will render the crew incapable of further action; a direct hit on the outside of the tank when a member of its crew has his head out will eliminate that person; and a direct hit on the suspension system may damage it enough to compel the tank to withdraw. All of the foregoing hits, however, are rare and extremely difficult to achieve.

Artillery of 155-mm caliber and above will, if a direct hit is obtained, knock out the crew and seriously damage a medium tank of the M46 type. Here again, however, we are confronted with the difficult task of obtaining a direct hit when indirect fire methods are employed. Unless the tanks are road-bound, at a halt, caught in a defile, or bogged down in soft ground, normal forward movement or other evasive action should suffice in preventing a direct hit. This does not, however, take into account the effectiveness of massing an excessive number of battalions of artillery on a small area, but is based on the fire of the normal number of battalions likely to be encountered on the average front.

Air.—The employment of air power against tanks, although productive of effective results in both World War II and Korea, has very definite limitations. First, there must be a fair degree of air superiority. Second, there must be favorable weather to provide necessary visibility. Third, assuming that the above two conditions exist, the plane must find the target while moving at tremendous rates of speed at great heights, descend on the target which can take evasive action, ignore anti-aircraft artillery in the area, and obtain a close hit with bombs or a direct hit with rockets. Once again, if our tanks are road-bound, caught in a defile, bogged in soft ground, or otherwise immobilized, and other favorable conditions exist for the use of air, then air is capable of rendering ineffective tanks so caught. When the above conditions do not exist, air attacks are not

likely to stop a determined effort by tanks in mass.

AT gun.—The AT gun received a tremendous amount of publicity during World War II, with particular emphasis on the German 88-mm dual purpose gun. This weapon attained its fame as a result of its employment by Rommel's Afrika Korps on two separate occasions. First, in the Libyan Desert against the British, and second against the Americans at Sidi-bou-Sid in North Africa. On both occasions, the Germans achieved complete tactical surprise. They led the Allied tank forces into a trap, and then sprung it from three sides. Surprise, then, is one condition necessary for the effective use of the AT gun and, in the above-mentioned instances, mass also was present.

Under normal battle conditions, the foregoing can be avoided by, first, detailed and accurate reconnaissance; second, providing flank protection; third, the echelonment of the tank force to one or both flanks; fourth, a reconnaissance by fire of likely AT gun emplacements; and fifth, close covering fire by follow-up echelons of the tank force. The sixth, and most important method of reducing the effectiveness of AT fire results from the close co-ordination of the tank force with its supporting artillery to provide for heavy artillery preparations prior to the attack, the use of smoke to protect its flanks during the attack, and the use of forward observers to effect quick adjustments once the enemy's AT guns have fired. The AT gun is the least to be feared of all AT weapons, if the steps outlined above are adhered to carefully. During battle, when the gun is fired, its position is exposed. With its position exposed, machine gun and high explosive fire from covering tanks and artillery should dispose quickly of the gun crew since they do not have the benefit of armored protection. On the other hand, give these same AT guns the armored protection of a tank and they could, if properly employed, hold up an attack for a considerable period.

The bazooka.—Continued research and development have increased materially the effectiveness of this weapon since World War II. The new 3.5-inch bazooka, which was given its first battle tests in Korea, can knock out any known tank. When first used in Korea against the Russian-built

T34, it achieved formidable results—seven rounds fired, seven tanks knocked out. Here we have an AT weapon which can go any place an infantryman can go, and it only requires a crew of two to operate it. The natural question then is: "Is not this weapon the answer to the tank?" The answer, unfortunately, is no. While it is of extreme value to infantry and airborne troops, once again specialized conditions are required for its use. These specialized conditions are a result primarily of technical limitations in the weapon itself, namely range and accuracy.

Although the range of the 3.5-inch bazooka is more than 100 yards, anything over that distance reduces materially the accuracy of the weapon. To be sure of an effective hit, the operators must wait until a tank is well within this 100-yard range. Then, in order to fire at a tank, the weapon crew must expose themselves and, in so doing, they become vulnerable to the fire of supporting infantry, other tanks, and artillery, particularly artillery employing the variable time (VT) fuze. All this presupposes that these same crews have survived the initial artillery preparation laid down by the enemy. The ultimate in courage and intestinal fortitude is going to be required of men who will sit in their foxholes and wait for tanks to rumble into range.

Here again the bazooka, like the AT gun, finds its greatest limitation in the vulnerability of its unprotected crew. In addition, its doubtful accuracy, except at minimum ranges, is another handicap to its effective use.

Before leaving the bazooka, it should be mentioned that the shaped charge principle, used in projectiles fired by that weapon, is also employed in the projectiles of other weapons organic to the infantry division, such as the 57-mm and 75-mm recoilless rifle, and the 105-mm artillery piece. Although these latter weapons are capable of bringing a tank under fire at a much greater range than the bazooka, they do not possess the accuracy of the obsolescent AT gun and, in addition, the projectiles have technical deficiencies which are being remedied. It is possible that continued research will ultimately perfect a portable one-man weapon which will use a shaped charge projectile and which will be effective against the present-

day tank at ranges of 1,000 to 2,000 yards. If this happens, the future of the tank is likely to become uncertain. It is well to bear in mind, however, that this same research may also develop a new type of armor plate which will resist effectively the shaped charge.

Mobility and Armor Protection

To link together mobility and armor protection is not as illogical as it might seem at first glance. Although it is true that one contradicts the other, at the same time they also complement each other. A decrease in armored protection, with its consequent reduction in the weight of the tank, also means an increase in tactical speed. Speed, in itself, then becomes a form of protection which will compensate, to a limited extent, for the loss of armored protection. Conversely, an increase in armored protection is a "must" when speed is no longer a factor. However, this will increase the weight of the tank and results in a loss of speed and mobility.

The resolving of the conflict between the demand for greater armored protection and that for increased mobility is a problem which has occupied the minds of the armored experts ever since the close of World War II. We mention it here since the requirements of the field forces become the basis of drawing-board designs. Infantry commanders must realize that their demands for greater armored protection, if satisfied, will reduce the mobility of the tank and limit its employment. They should weigh carefully, therefore, the advantages which will accrue from increased protection. In making such an estimate, they must also guard against too rapid an acceptance of the opposite theory which fanatically advocates greater mobility and fire power with minimum armored protection. Horse cavalry became obsolete because of the vulnerability of horse and rider to modern weapons. The towed AT gun, except in airborne units, has also been discarded because of the vulnerability of the crew manning it. The tank, too, may become a museum piece if the proponents of greater mobility and less armor go uncurbed. To one who has fought the famous German Tiger with the mobile Sherman tank and achieved victory, on the basis of a pla-

toon of Shermans against one Tiger, the spectacle is not pleasant to contemplate. The answer to this vital question probably lies in the trite phrase of "happy medium." We must be wary of either extreme and strive for an intelligent balance between the two. Except for 7 or 8 tons too many, the M46 (Patton) tank, which is the tank organic to the infantry division, probably may be the answer.

If we acknowledge, then, that mobility as well as armored protection and great fire power is desirable, of what use is this mobility? Mobility permits the rapid concentration of great fire power at the decisive point on the battlefield. Tanks provide the infantry division with speed, fire power, and mass which, translated from the potential, means terrific shock action. Shock action ensures the rupture of the enemy position and mobility ensures rapid exploitation and pursuit. That, briefly, is armored action. This type of action is not limited to the armored division alone, for it is available to the present-day infantry division. However, it must be understood and used properly. A commander who fails to use this potential speed and power, or who uses it improperly, is failing in his responsibilities to his command.

Judgment from Experience

We have already discussed some of the technical aspects of mobility, and the ordnance expert can give you more information in terms of flotation, slopes, and horsepower-to-weight ratios. But what about the practical aspects? Where can a tank go? What are its limitations as regards terrain? The answers to these important questions cannot, unfortunately, be placed on paper. Judgment in the use of tanks comes, the same as with other weapons, from experience. True experience is gained only on the battlefield. Therefore, commanders who do not have this experience must utilize every opportunity, in peacetime training, to determine the capabilities and limitations of their tanks. If that is done, there will be less tendency to expect too much, as in the last war, or not to demand enough.

There is no question that the cross-country movement of tanks is limited by certain types of terrain. As a result, all too frequently, since the last war, the expression "That is not good tank

terrain, so we will hold the tank battalion in reserve" has been heard. Unfortunately, in the majority of instances when the foregoing statement was made, tanks could have been used to achieve decisive results—perhaps with difficulty, but they could have been used. If a commander waits for what the average officer considers good tank terrain, to commit his tanks, many a "doughboy" will die needlessly for lack of tank support. Korea was not considered good tank terrain, but the North Koreans nearly won that war with tanks. In Italy, during World War II, the armies of Kesselring had to revise their AT doctrine because the 1st Armored Division, successfully sidestepping the main roads with their strong defenses, used terrain which was considered impassable for tanks. One of the surprising features of the German campaign in Norway was the presence of tanks in the German units driving through the mountains.

Capabilities and Limitations

Deep ditches, gorges, precipitous gullies, and swamps will block the advance of tanks until some pioneer work is done. But between these terrain extremes and tablelike plains, considerable ground is found which can be negotiated by experienced "tankers," ground which was all too frequently neglected because commanders failed to learn the capabilities of their armor. A word of caution, however, is necessary. There were, also, many commanders in the last war who, through lack of experience, went too far in the opposite direction and expected the impossible from their attached tanks. They assumed that tanks could go anywhere. A graphic illustration of this is found in the battle of San Pietro in the Italian campaign. After repeated infantry attacks had been repulsed with heavy losses, it was decided to try to take the town with armor. There was one main road leading into the town from the United States lines. Once on that road, no tank could get off of it due to its precipitous shoulders. Yet down this road, in a column, was sent a supporting tank company. Only three tanks from that company came back; none ever reached the objective. If you must use a road as an axis of attack, be sure the tanks can get off the road and deploy freely on either side.

The intelligent use of tanks demands an understanding of terrain and its effect on tank mobility. Without this understanding, commanders will waste their armor or fail to use it to the maximum.

The employment of tanks with infantry or infantry with tanks is a subject worthy of much study. Of necessity, therefore, this discussion will be limited to a coverage of those aspects wherein the greatest amount of confusion seems to exist.

Reference to available military textbooks will reveal that tanks should:

1. Provide antitank defense for the infantry.
2. Provide the infantry with direct fire support.
3. Capture and hold ground for the infantry.
4. Execute counterattacks against enemy penetrations.

The foregoing fundamentals governing the general employment of tanks with infantry are sound but, like any other listing of fundamentals, they cannot all be executed simultaneously, nor can one or two of them be stressed continuously to the exclusion of the others. Early in World War II, the tendency among infantry division commanders was to stress, almost entirely, the first two of these fundamentals. Later on, as this concept developed weaknesses, there was a trend toward the adoption of the third fundamental in which the tanks were expected to do everything without any infantry support.

Questions of Employment

At the present time, some 5 years after the war, there still seems to be a general lack of agreement as to how tanks and infantry should be employed. When the new infantry division was organized, officers assumed immediately that the tank organization within the division had solved their problem. The division tank battalion was to be used to capture and hold ground, and the tanks organic to the regiment were to work in the small tank-infantry team. Such an assumption is sound and logical, but it does not provide the complete answer. Adherence to a rule which places the tank in the same continuous role means that the capabilities of the weapon are not being used to the maximum. A commander must know

under what conditions to employ a particular organization. This applies whether we are speaking of tanks in the regimental tank company, or in the division and corps tank battalions.

The only tank organizations whose roles are fixed are in reconnaissance units and, in an emergency, they may be employed in other than normal roles.

The Tank-Infantry Team

The tank-infantry team grew up in the hedgerows of Normandy where neither tanks nor infantry could cooperate without the closely coordinated assistance of the other. Because of the terrain, and the defenses prepared by the Germans, the infantry squad or platoon with two tanks attached was the most efficient way to solve the tactical problem presented. While such conditions will be found in a future war, care must be taken that this role (for the tank) is not continued beyond the point for which it is needed.

The small tank-infantry team is appropriate under certain specialized conditions. These are the breaching of a fortified line, the attack of strongly prepared positions covered by deep mine fields, or attacks in wooded areas and towns. When we are fighting in open country and over good terrain, such a combination should be avoided. If this is not done, then the mobility and speed of the tank are lost, for it is slowed to the pace of the infantry and becomes extremely vulnerable to the fire of enemy tanks and self-propelled guns. For this reason, it is well for a division commander to anticipate such engagements, such as the attack of a fortified line, and ask for the attachment of a tank battalion from the corps tank group. These are heavy tanks which can withstand great punishment and deal more effectively with enemy pillboxes and armor. The infantry division tank battalion then can be employed more appropriately after the line has been breached, instead of being forced to dissipate its efforts in a role for which it is not best suited.

Under conditions other than those discussed in the preceding paragraph, armor should be used to lead the attack and, because of its speed, take objectives before the enemy can react, or by shock action if the enemy has already reacted. Such an action,

however, as an infantry attack, must be planned and coordinated in detail. Artillery, air, engineer, and infantry actions must be fitted into the picture. Artillery and air provide the preliminary preparation, the support during the attack, and flank protection when needed, while the infantry moves up first to relieve the tanks on the objective so the armor can continue the attack. At the same time, infantry cannot follow the armor too closely or they will come under the artillery fire which tanks always seem to draw. Neither can they be too far back or they will have to fight by-passed and overrun enemy infantry.

The danger in the separation of tanks and infantry is not, as many officers believe, the vulnerability of tanks without infantry but the vulnerability of infantry without tanks. In relatively open country (not jungle or woods), tanks can defend themselves with little difficulty as long as daylight lasts. The problem for the infantry element, therefore, is to stay as close to the armor as is necessary for their own protection and no closer. Let the tanks do the fighting while the infantry relieves on the objective and provides a harbor at night. The latter is necessary, if tanks are to operate efficiently the next day.

Dual Role Training

Commanders of infantry regiments must remember that it is not always necessary to assign a platoon of tanks to each infantry battalion. Many times, more decisive results can be obtained by employing the tank company, in mass, as the main effort. But, in so doing, it must be realized that tanks, to work in a purely tank team, must be trained for that role. Armored troops who have been trained to work in company and battalion tank formations can, with minimum training, revert quickly to the role of supporting the infantry as part of the small tank-infantry team. Those troops, however, which have been trained to work in the small tank-infantry team cannot, without considerable training, operate with any degree of assurance in pure tank formations. Training doctrine should, therefore, stress both roles for all the troops assigned to tank units in the division since, in the final analysis, each has its own peculiar techniques.

Underlying any discussion on the

employment of tanks with infantry must be the understanding that the tank is a powerful weapon that was made to fight. Despite the fact that its employment may be limited by obstacles, ditches, AT mines, and other tanks, most of the time it can be used where the infantry cannot go without suffering prohibitive casualties. At Anzio, the 1st Armored Division broke out of the beachhead successfully with only minimum casualties as compared with the heavy casualties sustained by adjacent infantry divisions. Therefore, whether you use the tanks in the first wave of an assault or use them as part of the tank-infantry team, be sure you use them whenever possible. They will reduce your infantry casualties.

A Powerful Reserve

Tanks are a powerful reserve and lend security to any attack, but they are of little value to anyone if the commander always keeps them in reserve or holds them back for AT defense. No matter the source of tanks under your command, look upon them *whenever possible* as a weapon to be supported, not a support weapon. If conditions do not justify tanks as the primary assault weapon, then use them in support of the assault. Return them, however, to the role of the weapon to be supported as quickly as possible.

Finally, this subject cannot be concluded without considering briefly the use of the tanks of the infantry division on the defense. Here, again, arises a conflict between those who wish to stress the close-support role of the tank (a mobile pillbox), and those who believe that tanks should be used more in the counterattack. The present organization of the infantry division lends itself nicely to the accomplishment of both of these roles. The tanks organic to the infantry regiment might be used to deepen the AT defenses of the battle position, and the division tank battalion employed in a counterattack role. It must be realized, however, that if the tanks are employed in the forward defense areas to provide AT defense, full advantage is not being taken of their mobility. Whenever possible, even at the regimental level, mine fields and obstacles should be used to provide AT protection and the tanks should be held back to provide the

"punch" of the counterattacking force. While the infantry, generally, cannot move fast enough to launch a counterattack at regimental level, the tanks can.

If tanks are used in forward positions, maximum use of camouflage should be employed. If this is not done, they will be detected early and countermeasures will be taken by the attacking force. Either heavy artillery will be brought to bear on the positions, or the enemy may shift the point of his thrust to another area where the tanks are not in evidence. To avoid this possibility, the forward positions for each tank should be prepared, using dozers if available. The position should be well camouflaged, but not occupied. The tank to occupy it should stay well back under cover, concealed from observation, ready to move up into firing position at the appropriate moment. Necessary firing data—such as range cards—should be prepared ahead of time. When the enemy armor approaches within 1,000 yards of the position, that is the time to take it under fire. Earlier than that will produce no effective results and will reveal the position of your tanks to the enemy. If the enemy is employing heavy tanks, this range should be reduced to 500 yards. At night, tanks should occupy their prepared positions in the event that the enemy launches a tank-supported night attack. Once again, however, complete firing data must be prepared in advance, if effective hits are to be obtained.

Summary

It is hoped that the foregoing discussion will contribute to a better understanding of the capabilities and limitations of armor. If armor is organic to your command, use its mobility and fire power *whenever conditions permit*. It is a powerful weapon that can hand out and take punishment better than infantry. Do not expect miracles, but do not hold it back where it will rust from lack of use. Whenever possible, place the infantry in support of the tanks. However, when necessary, do not hesitate to use your tanks to support the infantry elements of your command. Finally, to achieve the maximum from your armor, employ it with intelligence and understanding, as you would your infantry and artillery.

Self-Propelled Bridges

by LIEUTENANT COLONEL ROBERT B. RIGG

WAR on the ground has really not been modernized. Machines have made easier some of the tasks, but bridging a river in battle, for example, is still a hazardous operation. An army can always safely assume that in its advancing path the bridges will be destroyed. Re-bridging operations are one of the bottlenecks of battle progress and pursuit. Scientific tools have been unevenly applied to war if we note the ultramodern progress of air and anti-air combat as compared with ground warfare. Our present technique of constructing bridges under fire is little changed from that of Napoleon's era, except that a larger amount of firepower can be more accurately directed at the bridgehead by the enemy.

It is time that some imagination be applied to the problems of bridging terrain obstacles under fire. The infantryman and the tanker, not to mention the engineer, ought to be able to enjoy the battle luxury of an ultra-quickly constructed bridge, built from only one side of the river. With the instruments and equipment presently available we can improve the hasty bridge technique to increase the speed of construction, to lessen the casualties of a bridgehead, and to project a bridge to a bank we do not occupy.

This is not to outline any finished solutions, nor is it believed that the ideas here are as simple to apply as they are to promote on paper. But small rivers and streams can be spanned from the near shore without a large number of men exposing them-

selves to fire, if JATO* devices are employed. With development and experiment, self-propelled or rocket-launched bridges may well become realities.

Two means of launching bridges are suggested. For light bridges, the principle would be to fire a special anchor, trailing light cables, into the far bank, and, on the suspension system so created, complete a light bridge. The anchor would be propelled by a JATO-like device, and would vary in size with the type of the bridge.

For pontoon bridges, a special JATO-propelled pontoon would be fired into or onto the far shore, and subsequent pontoons similarly projected would lock into the lead one which would be trailing a cable to guide the others. The bridge would be formed by a series of joined pontoons. This would be for armored vehicles.

These spans would not result in ideal bridges, but their components could be prefabricated so as to permit final assembly of the bridge to be made with the utmost speed. Both types of bridges would be constructed almost mechanically, with the engineers working on the near shore only. Infantry and armor would cross a finished bridge to form and expand a bridgehead. Tactically it would be necessary to protect the bridge anchors on the far bank from enemy infantry and armor, but this is not an insurmountable difficulty.

For a rocket-launched footbridge, a "T" shaped anchor connected to light cables could be JATO-fired and dropped in a mortar-like trajectory on

the far bank of an obstacle. This would place the suspension system across the river, but the anchor would have to be so shaped as to penetrate the ground, and it should be further equipped with an explosive head which would lock it in position where it landed. The next step would be to tighten the cables and fasten them to a base on the near bank. To provide planking, notched aluminum sections could be fitted onto the cables one at a time and, powered by a small rocket, each one would be projected across stream. The minimum requirement for a footbridge would be achieved by this process. See Figure 1.

For a larger rocket bridge, a large bridge-anchor of several tons could be rocketed across a river on the same principle that a weighty airplane with JATO can rise at an angle approaching the vertical. This anchor would of necessity have to be heavy in order to force it well into the earth to provide a suitable base for a heavier suspension structure. The anchor would also contain heavy pulley arrangements. With these, stronger cables could be worked across and tightened, all work being performed from the near shore of the river. The next step would be to hook on the special prefabricated bridge sections to the cables. These might be motored across the suspension, or shot across by rockets. Obviously the approaches at the far end of such a bridge would require some human labor later, but the primary purpose of this span would be to vault combat troops over the obstacle as rapidly as possible. See Figure 2.

A pontoon bridge might be constructed along lines similar to those just described, but special rocket-propelled pontoons not unlike speed boats would be employed and the span would be able to carry heavier loads than the suspension types.

The initial pontoon would drag a light cable after it, and the pontoon

would have to be aimed at a suitable point on the distant shore. It should have sufficient speed and power to enable it to overcome the effects of wind and water current. It might even be radio guided, but in any event the success of the bridge would hinge greatly on the anchoring qualities of this first boat. It should be so designed to have self-anchoring devices that could be sprung or shot out upon impact with the shore. Once this pontoon is in place, its trailing cable should be made taut with the near bank, and additional JATO-fired pontoons would be launched to ram and lock into each other. Each of these pontoons would be a complete bridge unit with superstructure of stringers and planking. See Figure 3.

At the expense of seeming on the verge of Rube Goldbergism, it is practical to state that these JATO-fired pontoons should be amphibious in order to simplify the task of bringing them up to the near shore for launching. Properly designed, the components of this type bridge could be rammed across a river in a very short time, and the first tank over would knock down the approach-trestle on the anchor pontoon and make shore.

Conclusions

No effort has been made here to involve the reader in the technical details of equipment which at the moment is nonexistent. The inventive or critical minds will see many difficulties in the way of perfecting these unorthodox military bridges, yet I believe the same minds can solve the problems related to their perfection.

We as users of military equipment are too often prone to accept the materiel at hand, or be content to modify and improve it slightly. There has been too little inventiveness in military circles, and the future demands that the army apply the imagination and experiment that produced guided missiles and similar weapons. Ground warfare is a slow process at best, and it is slowed by terrain obstacles. The military can provide not only the specifications of what it will require, but also some constructive and imaginative ideas as well. The scientific talent and industrial know-how of the United States would not be hard pressed to perfect these bridges in conjunction with the military.

Let us modernize ground combat.

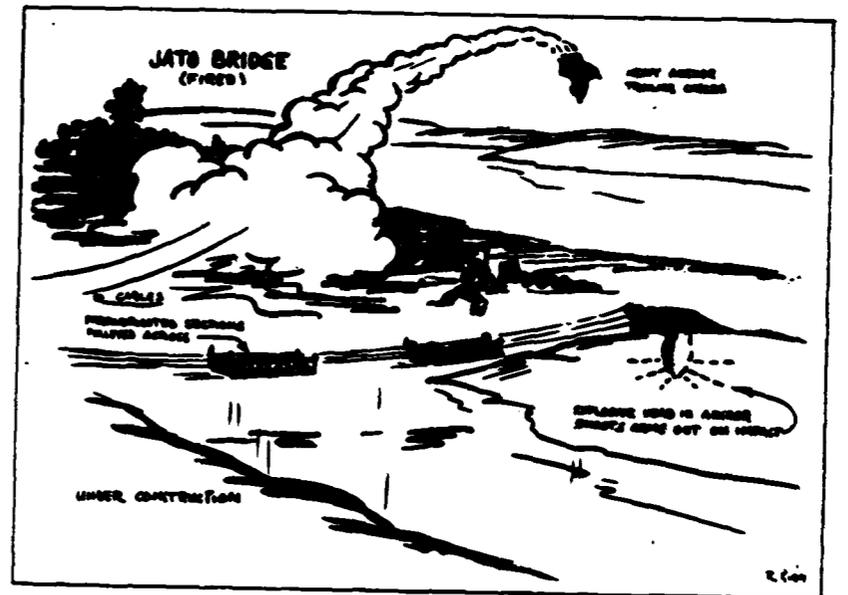


Figure 2.

Illustrated by the author.

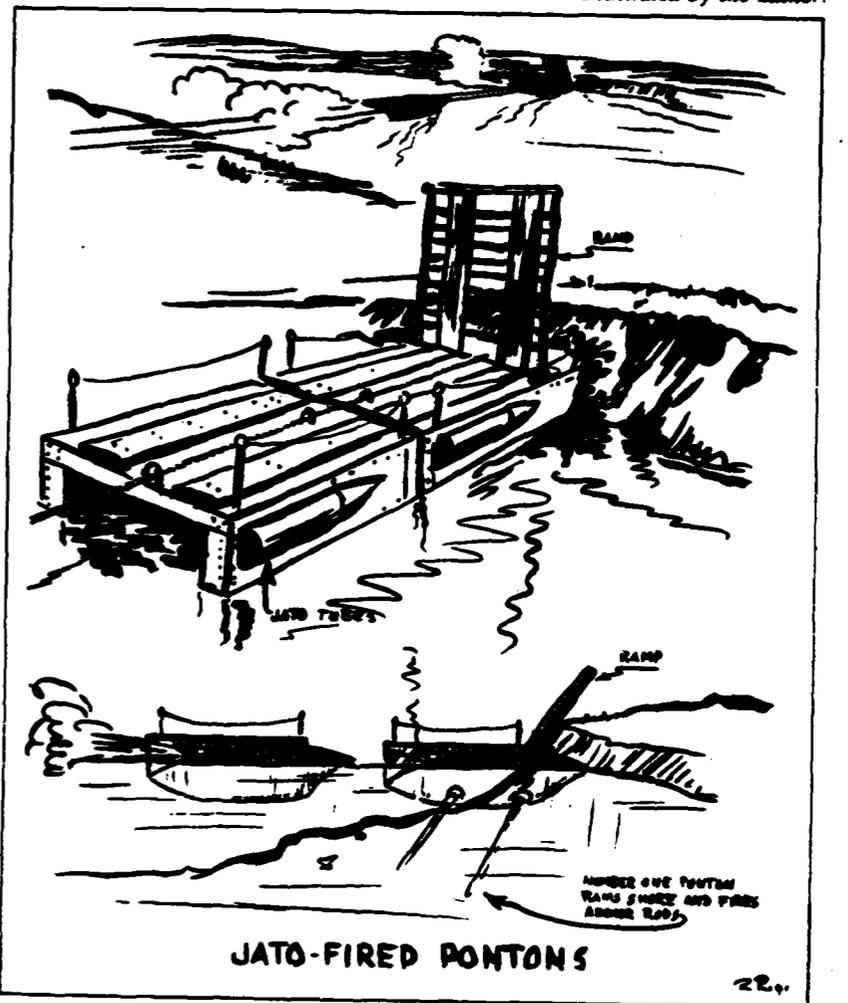


Figure 3.



Figure 1.

HOW WOULD YOU DO IT?

AN ARMORED SCHOOL PRESENTATION

AUTHOR: LT COL J C NOEL, JR

ARTIST: M SGT W M CONN

SITUATION: 1. The source of enemy fire encountered by a tank section is discovered to be about a platoon of enemy infantry entrenched around a well-concealed antitank gun at a distance of about 1200 yards. The platoon sergeant allocates the enemy infantry as your target while he is to engage the antitank.

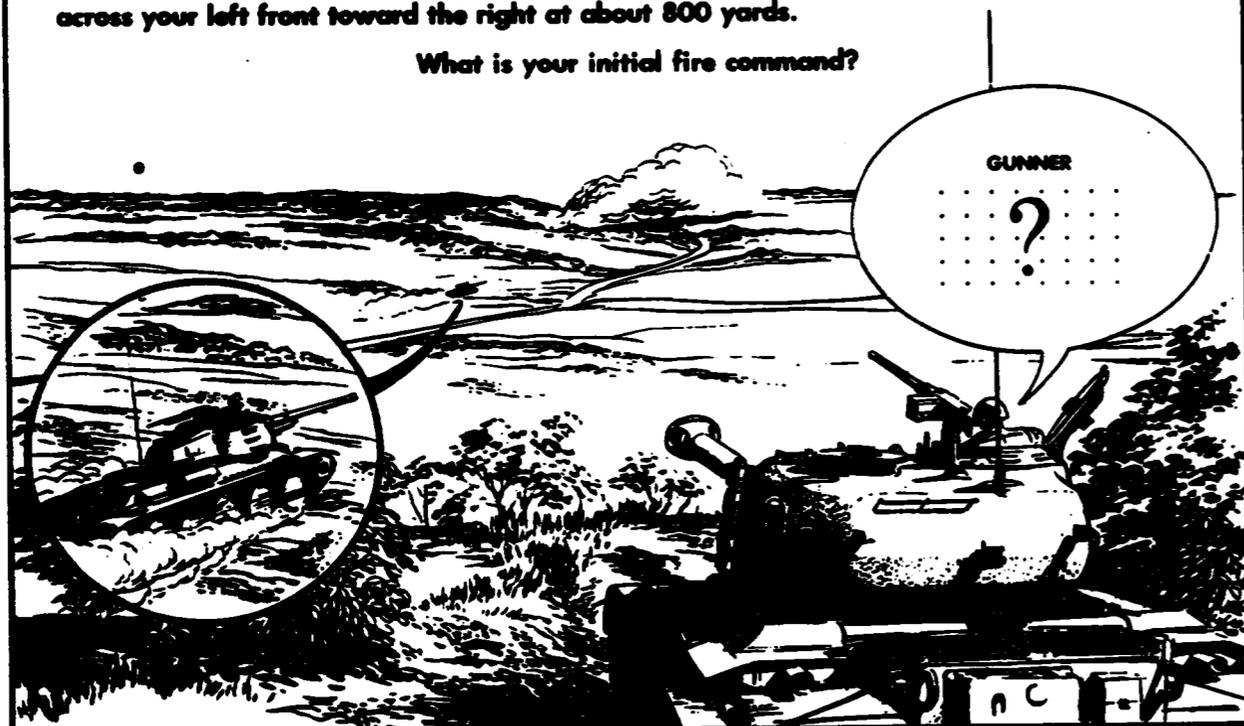
What is your initial fire command?



GUNNER
?

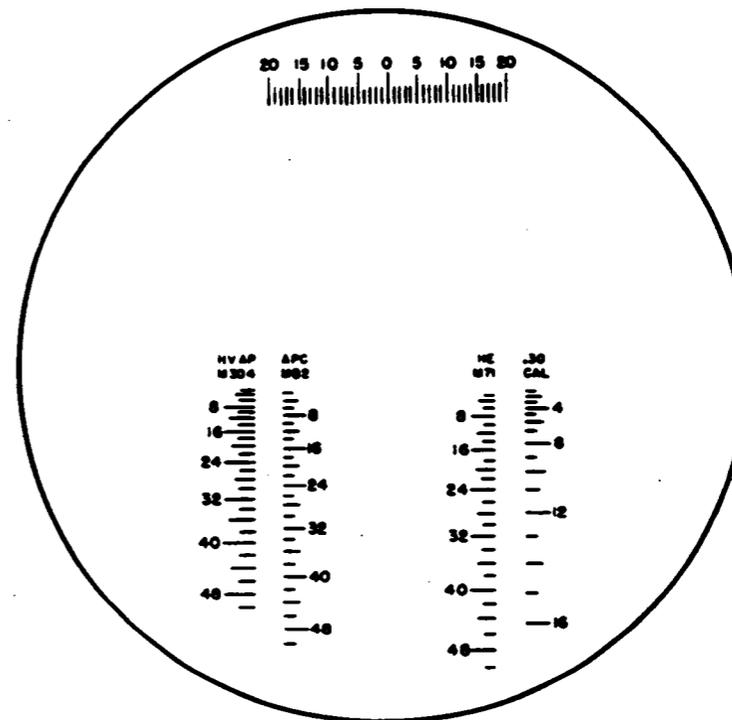
2. a. Having destroyed your target, you observe an enemy tank moving diagonally across your left front toward the right at about 800 yards.

What is your initial fire command?



GUNNER
?

b. In the preceding action the gunner, using a T152 telescopic sight, was successful. On the diagram below draw the index lines showing the setting made by the gunner on the initial fire command.



SOLUTION AND DISCUSSION

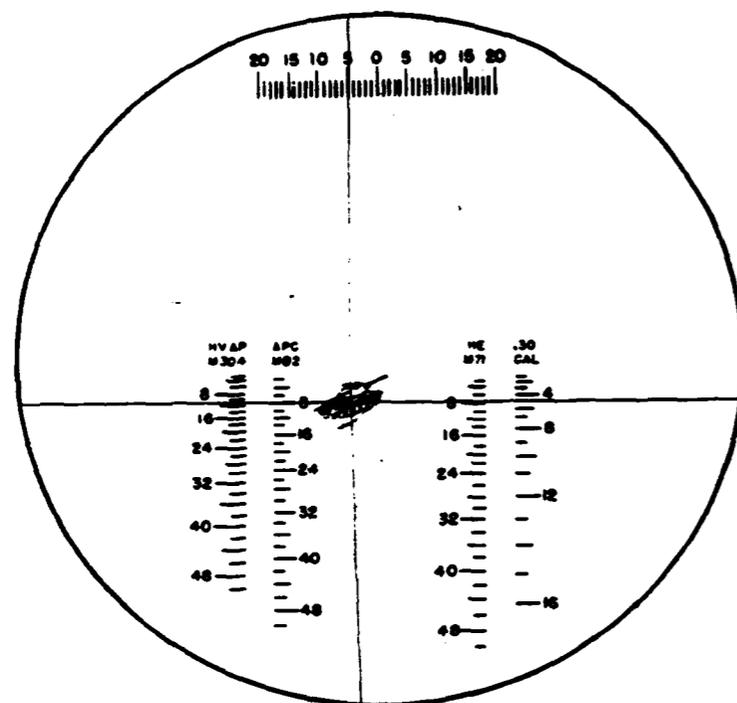
SITUATION 1. The initial fire command was GUNNER, HE DELAY (tank commander points gun using vane sight and his power traverse control handle), TROOPS, 1200, FIRE.

The effectiveness of massed tank action depends on the way the individual tank moves and fires. In combat, each tank normally performs as part of a section, platoon, or larger unit. At the same time, it is up to the tank commander to decide about positions, targets to engage if not specified by the section leader, and ammunition or weapons to be used. Once tanks are committed to action, unit commanders must rely on the initiative, resourcefulness, and judgment of the individual tank crew—especially on the capability of the tank commander. In this case, the tank commander decided to use high explosive ammunition with fuze de-

lay against the dug-in enemy personnel. Not only would this ammunition give ricochet air burst on the position, but it would provide sensing indication: the range to the target was in excess of the burn-out time of the tracer element in caliber .30 machine gun ammunition (700-900 yards).

SITUATION 2. a. The initial fire command is GUNNER, SHOT (tank commander points gun using vane sight and his power traverse control handle), TANK, 800 ONE LEAD, FIRE. Targets moving across the field of vision require a lead. The initial fire command calls for one lead (5 mils).

b. On the M46 tank, the gunner's sight is a T152 telescope with a sight reticle as shown below. The reticle has two movable index lines: horizontal for range, vertical for deflection or lead. These reticles are moved by knobs found just below the front mounting bracket of the sight mount. The T152 sight reticle incorporates an aiming data chart to facilitate the gunner's compensation for ammunition of different muzzle velocities. In this case, the gunner sets the horizontal index at 800 yards, under the APC column, and sets the vertical index 5 mils to the left of center. On the T152 sight the gunner sets his lead in the direction opposite to that of the moving target, and then re-lays on the center of the target.



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A GREAT FIELD COMMANDER'S WORLD WAR II MEMOIRS

A SOLDIER'S STORY. By General of the Army Omar N. Bradley. Henry Holt & Co., New York. 640 pp. \$5.00.

Reviewed by
ROBERT S. ALLEN

A Soldier's Story adds another notable achievement to the many that already emblazon the distinguished record of General Omar Bradley.

This book is outstandingly the best memoir so far published by a top military commander of World War II.

It is a superb literary and history feat.

In readability, organization of material, range and authoritative contents, both for the layman and the professional, in candor and, above all,

honesty, this after-action report is in a class by itself. There is nothing comparable to it by a battle commander in this or any other country. As World War II history, it is surpassed only by the masterful volumes of that peer of them all in any field—Winston Churchill.

There will be some who will fret and sputter over Bradley's blunt statements. Partisans of this and that outfit and personality are sure to be miffed, to put it mildly. This reviewer, for example, an impassioned zealot of General George Patton's illustrious Third Army, is firmly convinced a very good case can be made on the contention that on occasion General Bradley displays an undue protective partiality toward Hq First Army, which he commanded in the Normandy invasion.

But no one can question his honesty or accuse him of malice or unfairness.

Although he was obviously irked by Third Army's boisterous cockiness and strident aggressiveness, Bradley warmly lauds its great fighting qualities and history-making triumphs. He acclaims as "brilliant" the fabulous work of Patton's Staff in the Battle of the Bulge, and in recounting Third Army's subsequent equally astounding drive to the Rhine, remarks, "Third Army viewed defensive warfare as something to be shunned at all costs."

Bradley is similarly frank and fair about all others throughout the book. He gives generous praise where he considers it merited, and blunt criticism where he considers that due.

And he does the same thing about plans and operations. Bradley doesn't claim that everything worked out according to prior concept and schedule:

that no mistakes were made and that all came out for the best. Above all, he doesn't profess to have done all the masterminding himself and to have won the war practically singlehanded.

Not only in literary quality, but in tone and viewpoint *A Soldier's Story* is a far different—and much better—book than several others in the same category published a few years back.

Bradley tells all about the blunders: plenty of them, from Africa to the Elbe: bitter and tragic. He tells who was responsible for them, how they happened, and the grim cost. He spares no names and no details.

This honesty is one of the wonders of this volume.

Such forthrightness is virtually unknown among the military hierarchy. It seems to be an unwritten law

—The Author—



General of the Army Omar N. Bradley, graduate of West Point in the Class of 1915, became a major general two months after Pearl Harbor. Along a path from the States to Africa, Sicily and the Continent, in successive command of division, corps, Army and Army Group, he became field commander of more men than any military leader in U.S. history.

ARMOR—May-June, 1951

—The Reviewer—



Robert S. Allen, well-known journalist and Washington correspondent, formerly co-author of the syndicated Washington Merry-Go-Round column, is a Staff Writer of the North American Newspaper Alliance, and a radio commentator. He served as Executive G-2 of Patton's Third Army throughout the European campaign, telling its story in *Lucky Forward*.



With the 28th Division in amphibious training along the Florida Coast, 1942.

among them not to talk out loud about their failings and shortcomings, professionally and personally. Bradley's outspokenness is as rare as it is gentlemanly.

He makes no bones that he erred, and that he has likes and dislikes. He is a human being, and acts like one. But, always, a very decent one. He affects no superman role. There is no posturing or grandstanding. He is fully aware he is a commanding general, and also that he is not a tin god on wheels.

Luck and fate may have made Bradley a man of destiny, but he isn't running for anything—announced or unannounced.

He is a steadfastly honest, honor-



With Collins at Cherbourg.

able and conscientious American officer and gentleman, and his magnificent book is equally fine and satisfying. It's an exhilarating experience: makes you proud to be an American.

This country is truly in safe hands so long as it has leaders of the quality, courage and integrity of Omar Bradley.

Those who may be irked or offended by what he has to say will find it difficult to deny that Bradley bases his opinion on the record. There will be disagreement with his opinion—some of it probably very violent disagreement—but the record will be difficult to deny. That's the great strength of Bradley's book and his character.

He lays it on the line without malice or pettiness, and lets the record speak for itself.

A graphic illustration of this ingrained honesty is his attitude toward General Dwight D. Eisenhower, who not only was his superior officer, but who, literally, gave him his chance to win fame and exalted rank. Repeatedly, Bradley does not hesitate to let the record speak in a highly critical manner of his friend and commander.

The most dramatic instance of this is Bradley's account of his blunt showdown with Eisenhower after the Germans' back had been broken in the Bulge. Montgomery had staged one of his more odious antics, in the form of a press conference in which he

modestly told British newspapers how he had saved the Allied armies—an utterly unfounded claim, as the record clearly proves. Not only did Eisenhower not repudiate this thoroughly dishonest declamation, but he did nothing to put the quietus on an even more mischievous situation—Monty's long conspiracy to make himself commander of all Allied ground forces.

Following is Bradley's remarkable account of this extraordinary affair:

"While we labored to retrieve the integrity of U.S. command, the proposal that Monty be named top ground commander snowballed with the assistance of a part of the British press. And even though General Marshall had once reassured me that we would never be sandwiched under British command, I felt it necessary to state my position uncompromisingly to Ike. When I raised the issue, Eisenhower fended it off impatiently with a reassuring reply.

"Nevertheless you must know," I said, "after what has happened I cannot serve under Montgomery. If he is to be put in command of all ground forces, you must send me home, for if Montgomery goes in over me, I will have lost the confidence of my command."

"Ike flushed. He stiffened in his chair and eyed me hotly. 'Well —' he said, 'I thought you were the one person I could count on for doing anything I asked you to.'

"You can, Ike," I said. "I've enjoyed every bit of my service with you. But this is one thing I cannot take."

"Several days previously I had indicated to Patton that I would feel



Ike pins on a DSC cluster.

ARMOR—May-June, 1951



With Patton at Bastogne.

obliged to ask for relief rather than submit 12th Army Group to Montgomery's command.

"George clasped me by the arm. 'If you quit, Brad,' he said, 'then I'll be quitting with you.'

"By this time I could not have temperamentally subordinated myself to Montgomery's command. Not only were we as fully competent as the British but by now the U.S. had committed 50 divisions in the ETO in contrast to the 15 of Britain. So overwhelming a superiority, I argued, strongly supported our insistence that U.S. troops be fought under a U.S. field command.

"On this question of a super ground commander, Eisenhower stood firm and the British press relented. But during the period that this campaign raged, Montgomery did nothing to curb it. Yet he could easily have snuffed it out with a simple press statement disavowing any need for the over-all command that had been proposed for ground forces."

A *Soldier's Story* is in many respects the best account so far available of the virtually forgotten Sicilian campaign. Why this operation has been overlooked by military and other historians is a mystery. It included everything: amphibious, airborne, allied forces, and was completed in 38 days. It's a perfect example of a comprehensive and conclusive operation, yet practically nothing has been written about it. Bradley's account is excellent, but the campaign is worth a book of its own.

Regarding the ETO, which understandably occupies the bulk of Bradley's story, two facts stand out above all others.

(1) The previously noted conspiracy by Montgomery to set himself up

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as top battle commander, despite Britain's one-to-three inferiority in troops and his own many limitations, numerous costly blunders, and provocative anti-American bias and arrogance. The only two American commanders who were able to stomach Montgomery with any degree of tolerance were Eisenhower and the late Lt. General William H. Simpson, who commanded Ninth Army. All through his book, Bradley records instance after instance of Montgomery's infuriating scheming and high-handedness—including outright affronts to Eisenhower.

(2) The protracted struggle with the British over basic strategy in waging this war. This conflict lasted from the planning stage of OVERLORD until after the Bulge. The British were obsessed with one concept—to clear the Channel Coast. That alone ruled all their thoughts and aims. Everything else was subordinated to it. Bradley makes it abundantly clear that Eisenhower was under constant and tremendous pressure to give in to this demand. And he did give in, unfortunately. That's why the war was prolonged six months: why Third Army was sat down when it had nothing out in front of it but a routed and disorganized enemy and could have speared to the Rhine by November, 1944; why Monty suffered his bitter defeat at Nijmegen, and why he dallied about

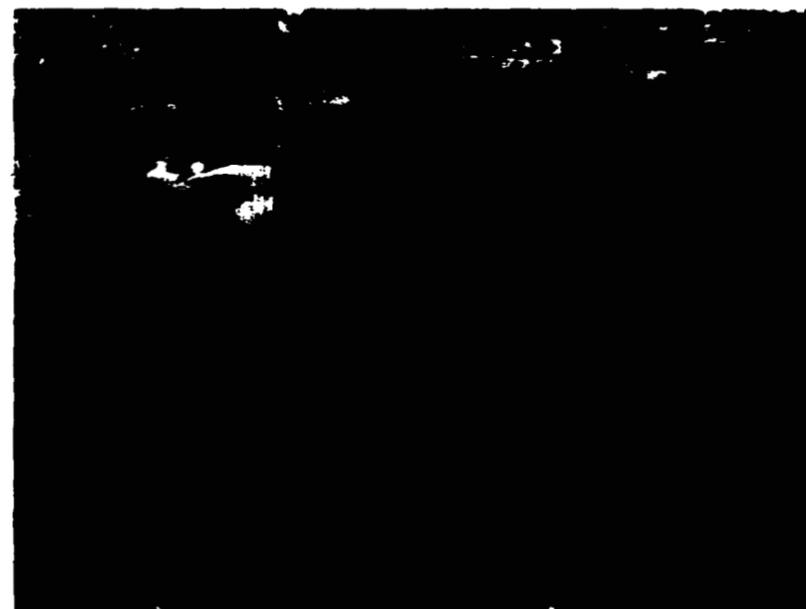


With Private John Powell.

clearing the Scheldt, with the result that weeks were lost before Antwerp, already captured, could be used as a desperately needed supply base; also, why the tragic Battle of the Bulge occurred.

This astounding "war within a war" is forcefully summed up in Bradley's dramatic account of the final collapse of the Wehrmacht, as follows:

"As Third Army made ready to bolt south from its bridgeheads below the Moselle and crash down on the Rhine at Mainz, Eisenhower at last came face to face with the long-disputed issue of a single versus a double envelopment of the Ruhr with a second thrust from the south. The question had been simmering for almost six months. In addition to the Canadian First, the British Second, and the American Ninth Armies already al-



High noon and a pull of the lanyard for Independence Day, 1944, Normandy.

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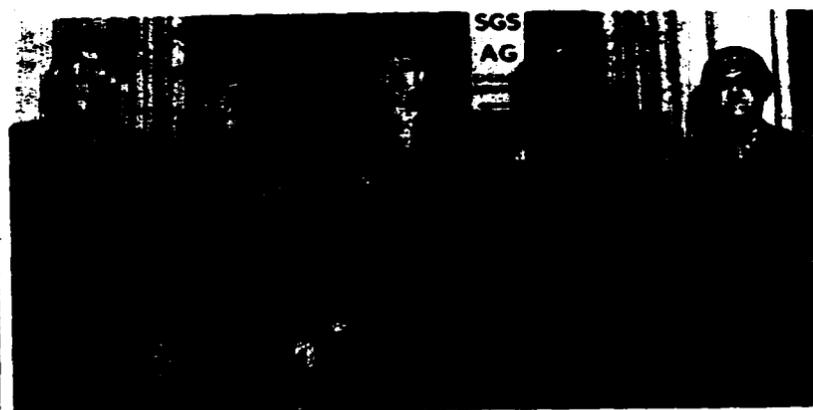
Montgomery of 21st Army Group.

lotted him for his major effort on the north. Montgomery had insisted that SHAEF set up a follow-up force in reserve of ten divisions to be 'borrowed' from First Army. It was in anticipation of this request that SHAEF had originally limited me to four divisions in the Remagen bridgehead. Had those ten been transferred to Monty as he asked, I would have been left with only the Third Army. And as a consequence Patton and I would probably have sat out the remainder of the war in a holding position on the west bank of the Rhine.

"Fortunately Eisenhower called Montgomery's bluff. If those ten divisions of First Army went north, Eisenhower told him, 12th Army Group was also to go north in command of both the First and Ninth U.S. Armies. Just as soon as Monty learned of Eisenhower's condition on those ten divisions, he promptly

dropped the request. Rather than give up the Ninth Army and share the northern thrust with an American Group command, he preferred to go at it with what he had and direct it from 21st Army Group. As a result our six months' struggle was finally won by forfeit and Eisenhower was able to resolve this most contentious tactical dispute of the war. First and Third Armies were directed by SHAEF to encircle the Ruhr from the south. Despite Bull's gloomy objections, Remagen was to form the springboard for First Army's advance to the Elbe."

A Soldier's Story is fascinating reading. It would be profitable reading at any time. It is particularly so in these chaotic and strife-torn days, when it is profoundly inspiring to have reaffirmed the fact that able, sincere, plain-talking and honorable men ARE in command of our armed forces.



With Army commanders: left to right: Simpson, Ninth Army; Hedges, First Army; Patton, Third Army; Gerow, Fifteenth Army. At 12th Army Group, March, 1945.

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A SPECIAL EDITORIAL

SPEAKING OF BOOKS

In previous issues of the magazine we have made known our desire to assemble at the Headquarters of the U. S. Armor Association a library on mobile warfare that will rate as second to none. We have set up a long-range procurement plan which visualizes the addition of every book that comes along on our special subject.

At the present time, we are somewhat ashamed of the library. Try as we will, we can't understand what successive staffs of our 66-year-old Association and 63-year-old publication did for essential reference material. The existing library is nothing more than a bare start. It is completely deficient in background on cavalry. It contains just a start on armor, and we have vowed that we will not allow the situation as regards cavalry background to happen to the armor end.

In mentioning our thoughts in the magazine we have had several offers from branch personnel to contribute books to our library. Coming for the most part from retired officers who wish to see valuable material put to good and active use, they have offered their personal libraries, so far as military books go, for donation to our shelves. Their kindness has prompted us to set forth some thoughts for other interested personnel.

The Association will be most happy to accept contributions of books for the Headquarters library. We would like the items to be limited to military subjects, and we are particularly interested in the technical and general books on *Cavalry* and *Armor*. Books covering campaigns in any war in history are most desirable. Our big emphasis goes on mobile warfare.

Those who feel they may wish to contribute books are requested to use the following procedure: Send us a list of the books you care to offer, in order that we may check it against our present file. We will then notify you which items we do not have and would appreciate having. All shipping charges will be paid by the Secretary of the Association. The books will be logged in the library, and in addition to personal acknowledgement by letter, a list of donors will be carried in the pages of the Book Section of the magazine. In later issues we will publish a list of titles of important books on our activity which are not in our collection. Undoubtedly some of the more valuable historical items will later be transferred to the Mounted Service Museum library when it is established, with the usable reference items being retained in the Headquarters for editorial use in connection with the magazine; for member use; and for historical research.

Any and all assistance in establishing our mobile warfare library will be sincerely appreciated.

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