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Orientation Before Battle
A Leadership Mechanism

MAJOR GENERAL LOUIS E. HIBBS
Commanding General, 63d Infantry Division

In order that the reader may have a proper appreciation of General Hibbs' excellent "Orientation before Battle," part of his letter to the Editor is here quoted:

"Having your recent letter in mind, I am enclosing something that may be useful to you, written in a brief and succinct form that needs no amplification. There are a lot of things that I could write about, but I think that what I am sending you touches something generally neglected by the leader in the urgency of other preparations.

"I consider that of all the mechanisms by which the higher commander may exercise leadership, none is more important than proper orientation before battle. Without knowledge of the plan and the objective, without confidence in ultimate victory, and without faith in the righteousness of his cause, the soldier lacks things that are vital equipment for combat. When great issues are at stake, the team needs the spur to high endeavor direct from the source, and it is his duty to provide it. As I have written you before, it must always be remembered that when the competition is close, superiority in morale is always the margin by which you win."

"In this connection it might be interesting to our readers to know that General Hibbs should be well informed as to the morale factor when competition is close since he was Director of Athletics at West Point shortly before our entry into the war.—THE EDITOR.

THE 63d Infantry Division opened the first breach in the Siegfried Line on the front of the Seventh Army, breaking through a double belt of fortifications just east of Saarbrücken and turning Combat Command A of the 6th Armored Division loose into Germany. Six hours before the jump off, and under special measures to insure secrecy, the following went down through the chain of command to every officer and enlisted man of the division and its attached units.

* * * * *

14 March 1945

TO: MEN AND OFFICERS OF THE 63D INFANTRY DIVISION.

Last month this Division brilliantly forced the crossing of the Saar River and led the Seventh Army back onto German soil.

Before tomorrow the Seventh Army attacks along its entire front. In the coming attack you will again strike first, into and through the Siegfried Line—blasting a hole in the enemy's vaunted West Wall, last barrier to the Rhine.

Weeks and months of sure and careful planning give you a vital part to play in a smashing victory.

You have demonstrated the drive and power of a first class division. I can tell you now that you will attack alongside two veteran divisions brought in beside you for the special purpose of making the main effort of the whole Seventh Army. Your past performance entitles you to this honor and faith in your skill and will to win. I expect to have history record that you not only equaled but that you surpassed these veterans in achievement.

Beyond the Siegfried Line lie crumbling Germany, the Rhine, and final victory. Your immediate task is to open the gate for our armored divisions. Only the best of the infantry is equal to that task. Yours is the honor and glory—take it away!

Pay dirt lies ahead. Blood and Fire drives in for the kill. The world will be watching you. Strike hard, fast, and viciously—victory comes by outfighting and outlasting the enemy!

LOUIS E. HIBBS
Major General, U.S. Army,
Commanding.
From Metz to the Saar
From a report of the 95th Infantry Division
Major General Harry L. Twaddle, Commanding

PRELUDE

"YOU are about to attack. You will face a determined enemy who in his years of fighting has attained high professional skill. If you attack with desperate energy you will succeed." So stated the Army Commander in a message to the 95th Infantry Division. On 8 November 1944 the division, disposed along an arc fronting the major forts of Metz, stepped off to the attack. Twenty-five days later, after toppling Metz and driving hard to the northeast, the 95th delivered to the Army Commander, intact, a bridge across the Saar River.

The gamble for the bridge at Saarlautern (Figure 1), accomplished in daring fashion, comes as a brilliant climax to a complex operation and constitutes the phase which will be covered in this article.

After the fourteen-day assault on Metz which saw the mopping up of the last resistance in the city on 22 November, the 95th Infantry Division turned the area over to the 5th Division and assembled east of the city in preparation for a drive to push the Germans within their own borders. Through brisk and heavy fighting which became very bitter as they approached the ground commanding the Saar Valley, the division fought its way; and on 30 November elements seized the high ground northwest of Alt-Forweiler, the ridge north of Merten, Ober-Limberg (on the bluff extending along the river north of Saarlautern), St. Barbara, Ober-Felsberg, and part of Felsberg (see Figure 2).

The 95th was now in a position to launch an attack that would take it across the Saar. At noon on 1 December, with threatening, bypassed resistance cleared from Dom de la Houve Forest to the south, the division could concentrate for an operation that was to involve a river crossing, street fighting in a major German city, and frontal assault of the Siegfried Line.

THE ACTION

There was no break in the fighting for the infantrymen of the two attacking regiments; but behind them in the division zone, supporting troops were being massed for the crossing of the Saar. The division's normal tank, tank destroyer, and antiaircraft attachments had been bolstered by the attachment of an additional battalion and battery of medium field artillery, a combat engineer battalion and two light equipage platoons, and three companies of chemical mortars. In addition, the artillery of the III Corps was placed in direct support of the crossing, as were the Fourth Tank Destroyer Group, the 1103rd Engineer Group, and elements of the 119th Antiaircraft Artillery (Gun) Battalion.

The division had had little choice in selecting its crossing site. North of the city of Saarlautern, which with its suburbs of Lisdorf, Ensdorf, Fraulautern, and Saarlautern Roden lay astride the river in the center of the zone, vertical bluffs rise above the west bank of the river. South of the city the ground is flat and the river spreads into an area of marshes. There was no weak spot in the German defenses; an observer looking down into the basin from Ober-Felsberg could pick up through his glasses the endless maze of pillboxes and bunkers that rimmed the east bank of the river and extended over the hills beyond. There were two possible crossing sites, and the division elected to use them both. The 379th Infantry, which had been held in reserve for the purpose, would pass through the 377th Infantry, seize the city of Saarlautern, and force a crossing there. South of Saarlautern the 378th would cross at Lisdorf and expand the bridgehead to the south. The 377th, after clearing the river bank of enemy in the northern sector of the division zone, would revert to division reserve.

Although the division now held the commanding ground it needed to begin the operation, it was still two miles from the crossing sites; and there were Germans holding strong defensive positions across the
entire division front. An estimated 10,000 German troops were opposing the division west of the Saar and in the crossing area, and intelligence reports indicated that the Siegfried defenses were being fully manned.

Bad weather during the advance to the Saar had denied the division direct air co-operation up to now; but requests were approved for medium bombardment after the river bank had been cleared so that the assaulting troops could exploit the shock action of the bombs; however, the limited availability of aircraft dictated the date of the air strike. At 1100 on 1 December eight groups of medium bombers pounded the crossing area, and, with an artillery preparation taking up where the bombers left off, the two regiments resumed their attack at 1235.

The 3d Battalion, 377th Infantry, cleared the enemy from Felsberg after stubborn fighting, and pushed on to Pikard at the outskirts of Saarlautern before dark. At St. Barbara the Germans were throwing in tanks again, and the 1st Battalion fought them off throughout the afternoon. The 378th Infantry pushed the stubbornly resisting Germans back from Alt-Forweiler and Berus, but its efforts to dislodge the enemy from dug-in positions on the high ground above Bisten failed. The 379th Infantry, moving in column of battalions, passed through the 377th late in the afternoon and joined in the attack on Pikard, jockeying into position for its attack into the city of Saarlautern.

The attacking forces held fast next morning, for they were crowding the bomb safety limit, and another medium bombardment of the crossing site, was scheduled. Between 1000 and 1145 ten groups of medium bombers (approximately 400 planes) unloaded over Saarlautern and its suburbs, and immediately behind them fighter-bombers pinpointed the

![Map of the area](image-url)

Figure 1.
barracks and military installations at the western edge of the city. The 379th Infantry resumed its attack, and by 1600 the 2d Battalion had pushed its three rifle companies into the outskirts of the city. The 1st Battalion swung north and took over the shattered barracks which had been the fighter-bomber's targets.

The 377th's 3d Battalion had turned northeast toward the river, and during the afternoon cleared the Germans from Beaumarais and pushed on to the outskirts of Wallerfangen. The 1st Battalion rooted the last Germans out of St. Barbara and pushed on toward Wallerfangen from the west, moving slowly along a road littered with mines and road blocks. The 378th Infantry was still heavily engaged on the division's right but made appreciable gains along the regimental boundary, which materially assisted the advance of the 379th Infantry into Saarlautern.

During the late afternoon the Germans unleashed the first of the tremendous concentrations of artillery that were to make the Saarlautern area all but untenable for weeks to come. In the streets of the city, where the 379th Infantry was fighting from house to house to expand its foothold, shells rained incessantly and casualties were heavy.

It was apparent that clearing the enemy from the Saarlautern crossing site was going to be a long and difficult operation, and the commander of the 379th decided to gamble on seizing intact the permanent bridge that still spanned the Saar behind the defending Germans. During the night, under the cover of a series of TOT [time-on-target] missions fired by the division artillery, assault boats were assembled at the barracks north of the city by the 320th Engineer Battalion. The 1st Battalion of the 379th Infantry moved silently down to the river and at 0345 the first boats pushed out from the west bank. In exactly eleven minutes the entire battalion had crossed the Saar, and not a single German outpost had been alerted.

A park lay between the river bank and the eastern approaches to the bridge, and the infantrymen crossed it quickly, disposing of the few sentries they encountered with knives or garottes. Just short of the bridge the advance elements of the battalion found a German armored car and bayoneted the radio operator inside before he could reach his key to flash a warning. Another German, standing in the shadows beside the car, turned and dashed for the bridge. The battalion commander's shot, which dropped him five feet from the switch controlling the demolitions emplaced in the bridge, was the first fired in the surprise attack. An engineer platoon, which had accompanied the leading infantrymen, immediately raced onto the bridge, cut all demolition wires, and fanned out with their mine detectors. Four 500-pound American aerial bombs, wired together in the center of the bridge, were disarmed and rolled into the water. Alerted at last, four German guards attempted to reach the bridge from the west side of the river and were killed by the fire of the engineers. A machine gun opened up then, and the platoon was forced back to the east bank where the 1st Battalion was deploying to guard the bridge approaches. (Two days later, when the Germans had abandoned their frantic efforts to retake the bridge and their constant artillery barrage had slackened, the engineers found and removed 6,400 pounds of TNT buried in eight twenty-five foot deep chambers built into the stone piers of the bridge.)

In conjunction with the crossing of the 1st Battalion, the 3d Battalion had sent a reinforced rifle company racing forward to seize the west end of the bridge. Charging directly down a city street, the riflemen fought from block to block and overran the old French bunkers guarding the approaches to the bridge. By 0830 the company controlled the streets leading to the bridge, and had gained contact with the 1st Battalion on the east bank.

The enemy in Saarlautern, disorganized by the sudden fierce assault, still resisted stubbornly, and the 2d Battalion was heavily engaged throughout the day. The 378th Infantry, advancing slowly against bitter, last-ditch resistance, entered the Saarlautern
from Metz to the Saar

suburb of Lisdorf and reached the Saar. Despite the constant pounding of massed German artillery, the regiment began clearing the river bank in preparation for an assault crossing, and the supporting engineers began moving their equipment forward. The 377th Infantry cleared the river line north of the city, outposted it, and pulled back into division reserve.

Shortly before dark the engineers, working methodically under the hammering of German artillery and mortars, removed the last of the mines scattered across the surface of the captured bridge. Tank destroyers of the 607th Tank Destroyer Battalion and supply trucks crossed to the east bank, and the 547th Antiaircraft Artillery Battalion set up guns to ward off possible bombing attacks on the bridge. The tank destroyers arrived just in time to assist the 1st Battalion in turning back a German counterattack spearheaded by tanks. One tank, loaded with demolitions, attempted a suicide run onto the bridge, but was blasted by a destroyer less than two hundred yards from its goal.

The gamble had paid off. The division’s bridgehead consisted of only a few city blocks, and it was still subject to counterattacks that would continue for days; but behind it there was a bridge, a great stone structure that would stand despite the heaviest concentrations of German artillery. It was the bridge that enabled the division ultimately to carve a substantial segment out of the Siegfried Line and deny the Germans the use of a large and valuable area of the rich Saar Basin.

Comments

The story of a particular operation conducted by an infantry division must, of necessity, be told in terms of its infantry units. The rate of movement is determined by the ability of a handful of riflemen to advance under fire; the front line is where they pause to reorganize or rest. The statistics that summarize such an operation also seem to apply peculiarly to the infantry. During the twenty-five days of the 95th Division’s drive to the Saar, infantrymen were the first to stride across the two hundred and seventy-three square miles of French and German territory wrested from the enemy. They were the first to meet the frightened civilians who crawled out of the cellars in the 160 cities, towns, and villages that were captured. They could, with justice, look upon the thirty-one major fortifications taken by the division as personal trophies. They knew the look, and the smell, of the 7,676 German prisoners who were sent streaming to the rear, and the 2,500 others who were left behind, bottled up and impotent, in the bypassed forts of Metz.

But if the infantrymen can lay claim to the lion’s share of the glory, they also paid the heaviest price for the ground gained. The great majority of the division’s casualties were suffered by the three regiments. To men in contact with a determined enemy, this steady attrition is likely to go unnoticed so long as the stream of reinforcements is constant; but between Metz and Saarlautern not
a single reinforcement was received, and the gaps that appeared in the ranks remained unfilled. On 3 December, when the 379th Infantry seized the bridge at Saarlautern, the combat efficiency of four of the division's nine infantry battalions had been greatly reduced.

The caliber of the troops they faced varied. There were fanatical youths lately transferred from the German Air Force who fought erratically but with fierce determination, and there were weary old veterans of the Russian campaigns whose will to resist flickered out at the sight of an American bayonet. The 462d Volksgrenadier Division, which was totally destroyed at Metz and never again appeared in the German Order of Battle, was below average. The 19th Infantry Division, which had its 73d Regiment wiped out, was run-of-the-mill. The 347th Infantry Division and the 539th Volksgrenadier Division, which opposed the division's advance from Metz to Saarlautern, were first-rate divisions. The 21st Panzer Division, thrown in along the approaches to the Siegfried, was one of the crack organizations of the German Army.

The infantrymen bore the brunt of the fighting, as always, but the operation was one that made them eternally dependent upon their supporting arms. There were days, when they were advancing rapidly across the open country between the Moselle and the Saar, when they might have thrown the Germans back with their rifles, machine guns, and mortars; but usually they were faced with situations beyond the capabilities of their organic weapons and equipment.

The four battalions of divisional field artillery, fighting weather and terrain to keep their weapons in firing position, maintained a curtain of fire in front of the advancing infantry; and time after time they swung their guns to deliver the sudden concentrations that crushed local counterattacks. During the twenty-five days of the operation the four battalions hurled a total of 51,850 rounds into the German lines, and certainly they can lay claim to a share of the estimated 2,692 German dead and 5,573 wounded.

The 320th Engineer Battalion was indispensable. Throughout the operation, engineers were with the advancing infantry, paddling their little assault boats across the Moselle, the Nied, and the Saar, building bridges, clearing road blocks under fire, sweeping mines, placing demolitions against the thick concrete walls of the endless forts, keeping the shattered roads open. And, fighting as they worked, they had accounted for a good many Germans in their own right.

There were times when service troops fought and combat troops hauled supplies. Every man had to do his own job, and many times he had to take over somebody else's. In the continuing assault operations the highest order of personal leadership was demanded, and invariably it was provided, although the cost was inordinately high.

Getting to the source of trouble is the only way of correcting it. And keeping an eagle eye on the sources of trouble BEFORE IT DEVELOPS is the only way of preventing it. That is known as Preventive Maintenance. Remember, it's a lot easier to look for trouble that isn't there than it is to fix trouble that is there because you didn't look for it.

—Maintenance Division, ASF
Throughout the various campaigns in the Southwest Pacific there had never been a real opportunity to effect combined air-ground operations in the strict sense of the term. There were, of course, various times prior to 20 October [1944] when the aerial units in the theater operated jointly with the ground forces, but never did the opportunity present itself whereby these units could participate in operations with the ground forces to the extent they desired, or to the extent the ground forces desired. Terrain was a limiting factor in this respect. For really close cooperation in the battle area, dense jungle is not the most desirable place to conduct low-level bombing or strafing missions. Those people who have participated in this jungle warfare realize that the opportunities for aerial strikes were far outnumbered by the lack of opportunities. It was exceedingly difficult to locate targets when all the hills looked alike. landmarks such as rivers were indiscernible from the air, and roads or road junctions simply did not exist. The jungle, except in very few instances, offered perfect camouflage by providing almost a complete cover over everything that existed on the ground. It must also be borne in mind that our air force in the beginning of this Pacific warfare had its hands full trying to keep the Japanese off our own airplanes, airdromes, and supply installations, and in cases where they were vulnerable to air attack, from the ground forces themselves. In addition, the air force had the mission of destroying the enemy air force, and at the same time was kept busy attacking strategic places in advance of our ground troops, continually pounding these places in an attempt to make the next ground operation as easy as possible.

Prior to the landing on Leyte on 20 October 1944, the ground forces carried the brunt of the enemy’s actions, and performed this mission in a superb fashion which probably no other army in the world, operating under similar circumstances, could have done better. They would have welcomed all the help, and more than the air forces could possible have given them, but as we have already seen, there was not the volume of operations conducted by the air forces that was desirable because of the limiting factors placed upon them, coupled with a lack of sufficient aircraft to conduct these operations and the lack of facilities to base the aircraft had they been available.

As our forces advanced from Australia through New Guinea to Biak and Morotai, additional bases were made available. Our aerial strength began to increase as more units were sent to the theater. The units already here were furnished replacements for battle-weary crews and new and improved aircraft were sent to various units. It was a tough proposition and one that was appreciated by ground and air forces alike. There were times when the ground forces felt slighted because there were no available aircraft to send on strikes at a particular time in their area, and there is no doubt that had the air forces been able to accomplish these strikes the ground forces would have profited greatly. Many ground units fought for a long time without ever seeing one of our own airplanes, and to say they were discouraged is a gross understatement. Without exception, every aerial unit in the theater felt as keenly discouraged about the situation as did the doughboy who was doing the dirty work. The airman’s lot was not a great deal different from that of the doughboy. He had the same mud, the same rains, and the same oppressive heat and mosquitoes to contend with as did everyone else. He probably spent as many sleepless nights in a
foxhole, as did the ground man. None of this was pleasant to any of our soldiers regardless of what branch they were in, but it did serve to provide the experience in their own specialty that led to the efficient teamwork that proved to the Jap later on that the two forces, working together, could throw a one-two punch from the air and the ground at the same time. This is giving the sons of heaven quite a problem to ponder.

Our Navy, now of such strength that it was suicide for the Jap to challenge it, conducted the first part of our combined air-ground operations at Leyte. It was here at Leyte that our forces had their first opportunity to fight on terrain where our training and experience really furnished us an opportunity to steam-roller the enemy from place after place. Naval aircraft were available in sufficient numbers to render strikes against the enemy in the first few days when the going was hardest. It was several days after the landing before the Army Air Forces were on Leyte, and again they had their hands full, as evidenced by the number of Japanese aircraft shot down and the number of vessels they sank when the Jap tried to reinforce his already doomed garrison. They were kept so busy that there was not much opportunity to run aerial strikes to help the ground forces, but there were enough run that experience was gained in combined air-ground operations which paid off in large dividends on Luzon.

As the campaign in the Philippines began, the Navy put into effect plans it had worked out long before. Like the Army Air Forces, the Naval Air Units gained experience and made modifications in their plans which improved their technique. For liaison between naval carrier and land-based aircraft and the ground forces, the Navy employed both Army and naval personnel. Air-Ground Liaison Parties, or ALP's as they were called, came from two sources. In one of our corps the ALP's came from a Joint Assault Signal Company (JASCO), which had already had experience in making the Japs unhappy with their efficient methods. These JASCO's were organized into parties consisting of one Army Air Force officer, three Army Air Force enlisted men, one naval officer, and two naval enlisted men. The party was equipped with its own radio, a jeep, weapons, and other supplies so that with the exception of messing and administration they could function entirely independently, and were self-sustaining. The part played by the naval personnel was to coordinate naval gunfire with air and ground operations. These JASCO teams were furnished thirteen to a division and were distributed one to each battalion, one to each regiment, and one to the division itself. In addition, each corps and army headquarters had its respective ALP. These ALP's landed with the assault troops in the first assault wave, set up their equipment, and were immediately prepared to transmit requests from the ground units directly to the Commander Support Aircraft Afloat. Each of the request emanating from a lower headquarters was monitored by the ALP at each higher headquarters. Thus each higher headquarters had the opportunity to evaluate the request as it affected the higher headquarters and also offered the commander of the higher headquarters the opportunity to consolidate the requests, to eliminate any duplications, or to disapprove any request in favor of another that might have been needed more urgently in some other area. If any succeeding commander disapproved a request, his ALP transmitted his disapproval directly to the Commander Support Aircraft Afloat. If he remained silent, his silence meant that consent was given the request.

In addition to this means of liaison, the Navy also provided a Deputy Commander Support Aircraft to work with the highest headquarters of the ground attack forces. All the personnel employed by the Navy received their training from the Navy. The other source of personnel was from the various ground organizations themselves who furnished officer and enlisted personnel from their own units to be trained by the Navy, and later they functioned as ALP's where there were insufficient JASCO's to provide ALP's for all units.
The Army Air Forces methods were very similar in nature to those of the Navy with a few exceptions. The Army Air Force liaison parties were furnished by Tactical Air Communication Squadrons, and were a great deal larger. These Air Liaison Parties were later designated Support Aircraft Parties (SAP's) to distinguish them from the Navy ALP's. The SAP and the equipment it carried with it were flexible as to size and quantity. As a general rule, the party consisted of two rated Air Force officers, in practically all cases rated aircraft observers, and twenty enlisted men who were technicians, cryptographers, radio operators, etc. Like the naval ALP's they carried their own equipment, supplies, and weapons, and were not dependent upon the ground units for transportation or supplies of any nature other than mess and administration. These SAP's took over the job of handling ground commanders' requests simultaneously with the assumption of the responsibility for combined air-ground operations on the part of the Far East Air Forces. Unlike the Navy, the SAP's worked with ground force headquarters no lower than divisions. However, the individual SAP's were of sufficient size that detachments could be sent to any place in the division area with whatever equipment was necessary to carry out any specific assignment.

Liaison between the air and ground units of the army began at Manus when liaison officers of the Fifth Air Force joined the convoy. The necessary directives and Standing Operating Procedures to carry out successful air-ground operations had already been published and the SAP's under the direction of Major Frank Quinlan of Fifth Air Force had already been intensively trained in their duties. The SAP's were all set up and ready to function when the Far East Air Forces assumed aerial responsibility on 27 October 1944. They were not only prepared to transmit division commanders' requests for aerial strikes, but they also served as an adviser to the division commander on matters concerning aerial tactics, their capabilities and limitations. They kept the various tactical air units advised of changes in the bomb line and changes in the ground situation.

Upon receiving the division commander's request, their procedure was to evaluate it as to whether the target was suitable for an aerial mission, whether the mission if run would be successful, etc. The request was then transmitted direct to a Bomb Wing which was serving as control headquarters during this operation. SAP's at corps and army monitored the requests as the naval ALP's did, and thus had the opportunity to coordinate and disapprove any and all requests made by the division commanders. If they remained silent it meant, as in the case of the naval method, their consent was given to the request. The commander of the Bomb Wing then dispatched aircraft as available and required on the mission, notifying the unit direct that the mission would be run. In the event it was not practical, because of aircraft not being available or for some other reason, to run the mission, the unit was notified that it would not be flown.

As the aircraft on the strike approached the area in which they were to execute the mission, they checked in with the SAP of the division requesting the mission, using Very High Frequency radio. The SAP or one of his party acting as a forward observer then led the aircraft over the target by actually talking him into the desired position.

From the Leyte operation there were several important lessons learned that later proved of value on Luzon. Some of these lessons are discussed below.

Both Army and Navy recognized the need for a uniform and standard method of application to eliminate the necessity for duplicate training on the part of the ground forces. As a result, representatives of the interested units have met, and a standard method has been adopted which is soon to be put into effect.

Methods of target identification were not in all cases as efficient as desired. For example, the use of smoke to mark targets worked all right in some instances, but in other cases as soon as our ground
forces marked a certain area with smoke the Japs countered by dumping smoke on our area too. Through experience, it was found that radio communication between ground observers and the airplanes themselves worked to advantage when aerial photos were not available. Ground liaison officers from the various ground units were attached to air force units down to and including squadrons, and their assistance in briefing the combat crews, keeping the ground situation up to date, and interpreting the ground situation for the air units helped considerably in improving the efficiency of the aerial missions.

Various technical equipment was found to be very efficient in aiding the pilots to locate the target, and to deliver their strikes in a minimum time and with more efficient results.

Because the requesting divisions did not always receive the message from higher headquarters disapproving their requests, it was decided to eliminate the procedure of allowing the higher units to signify their approval of a request by remaining silent. On Luzon, the higher headquarters transmit a message either disapproving or approving each request a division transmits to the Bomb Wing. Additional communication has been set up between various ground and air headquarters, so that a much more efficient exchange of intelligence is effected.

Probably one of the most important forms of liaison between the ground and air forces is by means of visits of pilots and aircrew members to the front lines where the fighting is taking place.

On Luzon, for the first time in the experience of the air forces in this theater, there has been a sufficiently large number of aircraft available that practically all requests from ground units are fulfilled. In many instances, air force officers, squadron and group commanders, operations officers, and participating pilots visit the ground units to view the situation before the strike is run. Thus they learn from the ground man's point of view the importance of the target to him; they can approach the target in a way to render maximum efficiency to the ground unit. Most important of all, this exchange of ideas on the ground provides the opportunity for the air man to appreciate the views of the ground forces, their problems and difficulties.

On the other hand, it also allows the ground man to talk to the people who are to fulfill his request, and to learn first hand just what obstacles exist and how they can be overcome. There are cases when the division commanders and regimental commanders, after reviewing the situation from the ground, have flown the mission in one of the participating aircraft, commenting upon any problems that exist in the air. After running the mission, ground and air men again get together to see what could have been done that would have made the strike more efficient, to examine first-hand the damage that resulted, and to view the reaction of our own and enemy forces.

This means of personal liaison has paid huge dividends in working out details of combined air-ground operations. Pilots find it very gratifying to know that through their own individual efforts a certain unit was able to advance over difficult terrain to seize their objective with a minimum of casualties. After running a strike, they can see the doughboy standing on his newly captured ground waving his thanks for their help.

The air-crew members themselves, upon talking to the individuals who have received their help, are aware that through the doughboy's efforts we are acquiring more and more bases nearer and nearer to the enemy.

This mutual understanding of one another's problems and the ability to discuss the situation with each other has provided an admiration for the work each is doing. The G-3 of one division reported that the air force units could consider themselves responsible for the saving of many American soldiers' lives. The airmen's reaction to this was that they wished they could do more; that the ground units were deserving of all possible help they could get from the air, and pilots actually prefer to fly missions close to the ground units and then talk to them to see what effect
their effort had in making things easier for the men on the ground.

The efficiency of this liaison is proved in the confidence the men have in their own and their teammates' ability. Missions are being requested that call for bombing and strafing within a few hundred yards of our front lines. These missions are executed to everyone's advantage.

Because of the experience gained in the Philippines, the ground and air force units have between themselves worked out a system of joint air-ground cooperation that is as efficient as any smooth-working team. It has been gained by practice and the conversion of mistakes into valuable lessons.

Our own forces know and appreciate what we have learned and practiced so efficiently in the Philippines. Probably the only other organization that realizes its importance is the Japanese Army itself. The results of this combination of air and ground strength can mean only one thing to them—they are up against an unbeatable team, and they realize it. As operations continue to progress, this combination means more and more trouble for the Jap. From now on we can put the best trained team in the world into the field. They have now finished their training season and are ready for the championship series, the outcome of which is already inevitable.

Breaking the Japanese Cave Defense System

A Battalion S-3 on Okinawa.

... The tactical lessons learned [in the Okinawa operation] were of great value in finding out the way to fight Japs in their well-organized cave defense system. Some of the general conclusions drawn were as follows:

1. Terrain must be thoroughly analyzed and particular attention given to studying the ground in an attempt to locate compartments and terrain features which can be isolated, neutralized, and destroyed successfully, thus enabling a concentration of power and weapons on one locality at a time.

2. If one avenue of attack permits the use of tanks, use this avenue in preference to others. Then use this avenue as a wedge to mop up adjacent positions.

3. While an attack is being concentrated in one sector, pressure must be kept on the adjacent sectors.

4. There is no position that the Japs can build which is impossible to take. However, general attacks against such positions result in an unprofitable loss of manpower. As long as time is available, casualties may be kept to a minimum by successfully taking and occupying a portion of the position at a time, concentrating the supporting weapons where the local action is taking place.
An Airborne Corps Operation
From a report by XVIII Corps (Airborne)
Major General Matthew B. Ridgway, Commanding General

It is suggested that the reader study the map before reading the article, as it graphically describes the complete operation.—THE EDITOR.

GENERAL

On or about 9 February 1945, while still engaged in the Roer River area north of Schmidt, the Supreme Commander, in person, informed the Commanding General, XVIII Corps (Airborne) that the Corps would successively command a three-airborne division operation east of the Rhine in support of the 21st Army Group; would be promptly withdrawn; and shortly thereafter would undertake a two-airborne division operation, likewise east of the Rhine, in support of the 12th Army Group.

The corps was withdrawn from the Schmidt area, 13 February; returned to base at Epernay, France; and, in accordance with directives from First Allied Airborne Army, began planning for the first operation under planning control of the 21st Army Group.

PLANNING

Twenty-first Army Group directed that the operation would be in support of British Second Army. The mission, evolved from conferences with General Officer Commanding that army; Commanding General, First Allied Airborne Army; and Commanding General, XVIII Corps (Airborne), was:

"To disrupt the hostile defense of the Rhine in the Wesel sector by the seizure of key terrain by airborne attack, in order rapidly to deepen the bridgehead to be seized in an assault crossing of the Rhine by British ground forces, and in order to facilitate the further offensive operations of the Second Army."

The 6th British and the 13th and 17th U.S. Airborne Divisions were made available to the Corps. British Second Army and U.S. Ninth Army, both under 21st Army Group control, were directed to furnish the necessary supporting troops and services. Both were furnished in generous measure, the bulk consisting of British formations, particularly artillery. Subsequently, the 13th Airborne Division was withdrawn from the operation.

British Second Army agreed to defer its assault crossing of the Rhine by as much as five days if weather should compel postponement of the airborne effort, which the Commander in Chief, 21st Army Group, and the General Officer Commanding British Second Army considered essential to the success of the Rhine crossing. Daylight was chosen for the airborne operation in order to take full advantage of complete Allied air supremacy and the overwhelming superiority of available Allied artillery.

Decision was made that the airborne strike would follow the ground force assault crossing, the first time during the employment of airborne forces in which this was done.

Development of the operation was planned successively to clear and secure divisional areas; to establish contact rearward with assaulting British XII Corps and to expand the bridgehead laterally to the south to seal off Wesel and make contact with the U.S. Ninth Army (Wesel was to be seized by a rapid night assault by the British 1st Commando Brigade); to further deepen the bridgehead to a depth of about 10,000 yards by a coordinated Corps attack to seize key terrain; to be prepared, on army order, to deepen this bridgehead to 15,000 yards by an attack in conjunction with XII Corps on its left; and thence to exploit eastward in accordance with army orders and the situation.

It was decided that the XVIII Corps (Airborne), less its divisions, would withdraw from this operation not later than D plus 6, in order to mount the next airborne operation, as directed by the Supreme Commander.

EXECUTION

The weather was excellent, and execution began on D-day, 24 March. Both divisions led with their parachute echelons. The drops, commencing at 1000 hours, concluded with the
AN AIRBORNE CORPS OPERATION

Assault crossing of the Rhine by British Second Army, supported by U.S. XVIII Corps (Airborne), 23-30 March 1945.

Last glider element shortly after noon. Fifteen minutes later, 240 heavy bombers dropped one day of supply by parachute to each division. Ground contact being established with British XII Corps on D-day, and ferrying and bridging operations being ahead of schedule, the supply situation permitted cancellation of all planned subsequent air resupply missions. The airborne phase of this operation therefore terminated at about 1330 on D-day.

The operation was developed in full conformity, phase by phase, with the plan. By the time the final planned phase line, about 15,000 yards deep, was about to be reached, the Corps ordered this line disregarded and maximum exploitation to the east, the objective being to seize debouchment areas beyond the defiles at Dulmen and Haltern in order to permit British and American armor to break out into the north German plain.

Prior to this time the 6th Guards Armored Brigade (Scots Guards, Coldstream Guards, Grenadier Guards) had been attached to this Corps. Attaching the 513th Parachute Infantry to this brigade, it was pushed with maximum speed and energy to the east, and rapidly seized the debouchment areas desired. Immediately on the heels of this brigade, the infantry of the 17th Airborne Division arrived, took over the defense of these areas, and freed the Guards Armored Brigade for its rapid subsequent movement on Munster.

Meanwhile, through both the Dulmen and Haltern defiles, the exits of which were now securely held, the U.S. 2d Armored Division exploited eastward.
STATISTICS
During the six-day period 24 to 30 March, in which this Corps controlled the operation, it averaged a daily advance of over seven miles; took 8,000 prisoners; destroyed the 84th Infantry Division; and, by verified but very incomplete count, captured or destroyed 124 artillery and antiaircraft pieces and twenty-six tanks. The withdrawal of the Corps on D plus 6 made it impossible to get full reports from the divisions. It is believed that the amount of matériel captured and destroyed greatly exceeds the above figures.

CONCLUSIONS
The Commanding General, XVIII Corps (Airborne), made these comments on the operation:

a. Concept and planning were sound and thorough, and execution flawless.

b. The impact of the airborne divisions, at one blow, completely shattered the hostile defense, permitting prompt link-up with the assaulting XII Corps, the 1st Commando Brigade, and the Ninth Armored on the south.

c. The rapid deepening of the bridgehead materially increased the rapidity of bridging operations, which, in turn, greatly increased the rate of build-up on the east bank, so essential to subsequent successes.

d. The insistent drive of the Corps to the east, and the rapid seizure of key terrain in the Dulmen and Haltern areas, were decisive contributions to this operation and to subsequent developments, as by it both British and U.S. armor were able to debouch into the north German plain at full strength and momentum.

e. In planning and in execution, the cooperation of participating air forces, both British and American, I consider completely satisfactory. There was no enemy air interception. The fighter-bombers, in their counterflak role, were as effective as could have been expected. The air resupply by heavy bombers was timely and met a critical need. Troop delivery by IX Troop Carrier Command was on time and, with minor exceptions, in the correct areas.

f. I wish particularly to record that throughout both planning and execution, the cooperation and actual assistance provided by the Commanders, Staff, and troops of the British formations under which this Corps served, which it commanded, or with which it was associated, left nothing to be desired. For my part, I have never had more satisfying professional service in combat, nor more agreeable personal relations with participating commanders.

Execution “By the Manuals”
Extract from a letter from an infantry battalion commander on Okinawa.

Colonel ________ often told us, as you had told us at Leavenworth, that the principles laid down in our field manuals were applicable no matter who the enemy or what the terrain. He knew the field manuals backwards and forwards and constantly made references to them. His sound application of these principles made history in this campaign [Okinawa], as you have probably read in the combat reports. A lot of officers have tried to say that fighting the Japs in their cave defense system called for entirely new tactics. Colonel ________ proved that this was not true. He showed that the proper application of fire power, intelligent application of the basic tactical principles, aggressiveness, and surprise would beat the Japs no matter how they chose to defend. Our failures on this operation were all a result of not following the “school solution” . . .
An Introduction to Naval Tactics

CAPTAIN MILES R. BROWNING, United States Navy
Instructor, Command and General Staff School

World War II has spotlighted, as never before, the need for the closest understanding and cooperation between our armed services. It behooves us all to bend even greater effort toward cementing this relationship. To this end, the MILITARY REVIEW presents, commencing with this issue, a series of articles on naval tactical subjects, each one complete in itself, designed to give the uninitiated Army officer an insight into the principles which govern warfare at sea.

The articles in this series have been written by Captain Miles R. Browning, USN, an instructor at the Command and General Staff School. Captain Browning has had wide experience in practically every field of naval operation. A graduate of the Naval War College in 1937, he has been an active naval aviator for twenty-one of his thirty-one years in the Navy. His current assignment is not his only first-hand association with the Army; in 1937-38 he was instructing in Naval Operations at the Air Corps Tactical School, Maxwell Field, Alabama. Prior to coming to Fort Leavenworth, he commanded the aircraft carrier Hornet. He served as Chief of Staff to Admiral William F. Halsey in the Pacific from June 1941 to July 1943.

"An Introduction to Naval Tactics" is the first article of the series.—THE EDITOR.

To the average military man who lacks the advantage of a background of extensive association with the sea, the term "Naval Tactics" evokes a confused picture. In his mind's eye he sees a kaleidoscopic scene of swirling water in the crisscross wakes of ships at high speed, huge gyers from "shorts" and "overs," and sheets of flame from the broadside fire of heavy batteries. He finds it difficult to perceive any pattern in the swift and apparently unrelated actions of the various formations of ships; yet such a pattern is invariably present in any surface sea engagement. Not only is the tactical design a clear and logical one, once it is discerned, but also its fundamentals are surprisingly closely akin to those which form the foundation for the more easily distinguished relationship of fire power and maneuver in conflict on the land. In naval action there are frontal assaults, flanking movements, holding attacks, and penetrations and patrols, just as there are in ground warfare ashore. Indeed, anomalous as it may seem, it may properly be said that there is even stabilized position warfare on the sea. A line of defense may be established by a belligerent, extending through one or more anchoring strongpoints and across hundreds, or thousands, of miles of open water; just as this may be done on a continental land mass. In the early months of the present war with Japan our own well-known "Dutch Harbor-Midway-SamoA Australia" defense line is a classic example of such position warfare at sea.

A man-of-war is, in effect, an integral organized point position. At anchor or stopped, she is a fixed position; underway, she is a moving strongpoint, possessed of unrestricted orientation of her fields of fire and capable of swift movement in any direction. Her infantry, artillery, supplies, communications and service agencies, all move with her and at the same speed. This is true not only of the single warship; it is doubly so of groups of ships.

A force or fleet is an extensive organized position comprised of a number of mutually supporting strongpoints. By the simple expedient of prescribing the desired "disposition," these ship-forts are stationed to provide the maximum of fire power in any given sector or sectors. The whole disposition is capable of being re-oriented in a matter of minutes, and the direction of its movement may be changed, to include reversal, in the time it
takes for one ship to turn. Large naval forces include their own air forces, both strategic and tactical, as well as their service agencies and traveling supply dumps. Such forces are fitted to conduct sustained combat operations within the limits of the supplies which they carry with them. By bringing up replacement fuel and munitions in cargo ships, and by replenishment from these at sea, they are rendered capable of much more protracted "front-line" service. Such naval forces exercise command of all the sea area within their effective radii of action and within which the enemy is unable to meet them with equal or superior forces. It is this concept of sea power as an organized position on the move which brings out so clearly the striking similarity between the tactical principles of land and sea warfare. Let the reader imagine the entire zone of action of an army, or an army group, including all installations, troops, and arms, suddenly put on rollers and capable of overland travel at a speed of thirty-five miles an hour, practically without regard to terrain features. In so doing, he will have called up a mental image of a combination of fire power and movement very similar to that demonstrated by one of our fleets roving Japanese waters.

Continuing this analogy between the battle disposition of the ground army and that of the fleet, we find that the similarity extends far beyond that exhibited in the overall design. Flank and forward outposts, pickets, warning systems, gun emplacements for artillery of all calibers at points behind the line, and the mobile reserve, all find their counterparts in the disposition of the fleet at sea. In like manner to the practice in ground zones of action, the air bases of the fleet's carrier components will be found in locations behind the lines where they cannot normally be reached by enemy fleet surface forces and artillery unless they effect a major break-through. The munitions ships and tankers which make up the fleet's "train," i.e., the service command, will also be located in the secure area in "the lee of the main body." In protracted operations, if sheltered harbors exist in the area under our control and within reasonable distance of the contact line with enemy-held waters, the units of the train will enter them and there remain in readiness either to service fleet units as they come in for the purpose or to get themselves under way and rendezvous with the combat forces up forward for transfer of supplies at sea.

It is axiomatic that any military force, no matter what its composition or the medium in which it operates, must maintain at all times some degree of compromise between its readiness to strike in full strength and its ability to defend itself from surprise attack. In naval warfare, the degree of probability of early contact with the enemy fleet is the most important factor in determining what that compromise shall be. It is only against opposing fleet surface forces that a fleet's striking power can be exploited to the last ounce. For this reason, until there is immediate probability of surface action, the deployment of a naval force will normally stress defense against surprise at the expense of instantaneous development of full hitting power. The principle applies equally to land warfare, and this balance between security and offensive potential is arrived at in the fleet disposition by the same logical process as in the case of a ground deployment.

It should be noted, however, that any overseas movement of a naval force is subject to the immediate menace of mine and submarine attack from the moment that the ships clear the nets at the home harbor entrances. Enemy submarines can reach and patrol any waters in the world. In this respect, security makes demands in excess of those imposed upon ground forces when the enemy advance posts are still far away. The fleet disposition takes care of this by stationing screens of destroyers, equipped with sound-detection devices, ahead and on the flanks, by the use of aircraft antisubmarine patrols, and by the employment of "zigzag" courses in its movement. When within range of enemy air attack, the disposition will feature air defense. In a typical
such disposition, the more vulnerable big ships (carriers and the train, if present) will occupy the center or hub of a circular formation (Figure 1). They will be surrounded by concentric rings (normally two) composed of battleships, cruisers, and destroyers in that order from the center outward. The outer ring, in addition to its air defense function, serves as the antisubmarine screen for the entire force. The big ships in the middle are, of course, the most valuable targets for enemy attack; their individual stations are such as to afford freedom for evasive maneuver within the screen and to develop maximum volume of their antiaircraft fire. The screening rings are so spaced along the radius of the disposition that automatic weapon fire does not endanger units on the adjacent circle. The assigned position of each ship or unit of ships in the disposition is termed a station. In addition to the stations in the center and on the screening circles, a picket of one or more destroyers is frequently stationed every ninety degrees well outside the screen, for early detection of low-flying aircraft. Within these dispositions, radar warning responsibility and fighter direction of combat patrols are highly organized and closely coordinated. The channels of visual signal responsibility, both outward from and inward to the center, are specified in detail. Complete doctrine is prescribed for the development of antiaircraft fire to cover every contingency. The disposition is exercised constantly in all these features of its defense, whenever enemy activity, itself, does not prevent.

When contact with enemy surface forces becomes probable, the emphasis in the disposition is shifted to instant readiness to develop maximum surface fire power instead of antiaircraft fire power. The disposition so formed is termed a “ready” disposition and the components of the force are so stationed that they are ready to deploy instantly. Here the reader may logically ask what further deployment, beyond being ready, is necessary or practicable. The answer to this question lies in the fact that the big gun is the prime weapon in naval surface action, and big guns are invariably sited in center-line batteries in the ships. Because of this, the full fire power of main batteries can be employed only to one side or the other of the ship. With the exception of the British battleships Nelson and Rodney and the Japanese Tone class of heavy cruisers, all fleet men-of-war in the world today have their main batteries in two or more groups of turrets or mounts, separated along the
Figure 2.—Effect of main battery arrangement on masking fire.
fore and aft line by superstructure of one kind or another. As a result, there are two sectors, one from dead ahead to about thirty degrees on either side of the bow and the other in a similar location astern, in which a part of the battery is masked. In the cases of the Nelson, Rodney, and Tone class, the entire main batteries are masked in the after sector (Figure 2). The existence of these masked sectors lies at the root of what is meant in naval terminology by "deployment." It involves not only the positioning of the combat elements, but also their direction of movement relative to the target so that the latter may be fired upon by every gun. A fleet in a ready disposition is a fleet which has positioned its components in such a manner that one turn to the "deployment course" will complete the cycle and permit this full fire upon the enemy.

Bearing in mind this inherent necessity for maneuver to bring to bear broadside fire, another essential feature of any ready disposition will be easily understood; namely, the "axis." This is merely an imaginary line whose azimuth is specified by the officer in tactical command, and relative to which all stations in the disposition are established. The axis is always pointed toward the known—or best estimated—location of the main enemy fleet strength. Figure 3 shows a typical ready disposition in skeleton form. Only the main body of the force is shown; the carrier components of the fleet, and any train or convoy, will be operating "in the lee" of the main body, i.e., below the bottom of the sketch and on the side of the battleline away from the enemy. The battleline is the base unit through which the axis passes. It is composed of the heavy strength of the force, normally battleships. The flank and center forces are known collectively as "light forces" and are normally composed of cruisers and destroyers. The station of the "forces in the center" is not always occupied; when it is,

![Diagram](https://via.placeholder.com/150)

**Figure 3.—Typical ready disposition.**

these elements form a mobile reserve to be thrown to either flank upon final deployment. Normally, they would be thrown to that flank which is in the van (ahead) when the deployment course is taken. Obviously, the deployment course may lie either to the right or to the left of the axis; which side will be selected will depend upon many factors. The location of enemy bases, and of our own bases, relative to the scene of the action, the direction and strength of the surface wind and sea, the light conditions and the time of day, these and a host of other considerations affect the choice.

Figure 4 shows the typical final deployment. All guns in the battleline are unmasked and the flank forces are on station
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ahead and astern of the battleline, and slightly advanced toward the enemy. The center forces have joined those on the van flank. All flank forces have the dual mission of delivering torpedo attack against the enemy battleline and of preventing the enemy light from the next by about a thousand yards, so that the line is approximately one-half mile long for every ship in it.

We have been glancing at a few of the basic principles of naval tactics. As we have seen, they are fundamentally simple and logical and they are largely based upon a formalized conception of the fleet action. During the present war, naval battles in the Pacific have presented few examples of engagements which developed along classic lines; rather, they have been featured by long-range carrier duels, surprise night encounters, and light force melees. Superficial observers have been prone to assume, as a result, that the school of the fleet action, built around the big guns of the battleline, is outmoded as a source of sound tactical development. The more careful student, on the other hand, will find that precisely the same principles which find their epitome in the formal engagement have, in fact, featured the tactics used in practically every surface forces from gaining advantageous position on the bow of our own battleline for the same purpose. In the action, the battleline range (i.e., gun range between opposing battlelines) is normally opened or closed by simultaneous turns of not over thirty degrees by the battleline units, toward or away from the enemy line. In selecting the deployment course, every effort is made by the officer in tactical command to establish it, at the outset, exactly perpendicular to the bearing of the enemy (the axis). If he fails to accomplish this, he may well find a portion of his battleline under a destructive concentration before the remainder has reached effective firing range. The battleline, itself, comprises a number of ships, each one separated

Figure 1.—Deployment from typical ready disposition into typical battle disposition.
meeting we have had with the enemy. For the novice, an understanding of the what and why of the typical ready and battle dispositions we have looked at, and of the processes of fleet deployment, will do more to open the door to comprehension of naval tactics than any other single acquisition he can make.

Fleet Supply System

Digested at the Command and General Staff School from an article in Army and Navy Journal.

BEHIND the operation was the advance base, support for the mobility of the fleet and key in the Navy's network of supply that delivered the flow of men, material, and weapons direct to the fighting fronts.

The immensity of the network can be judged from the fact that distances in the Pacific cut supply ships down to three round trips annually. Its complexity appears in the fact that the flow of materials involved elements ranging from corn flakes to the latest floating sectional dry docks, from heavy machinery that takes more than two years to build to items that can be made in a day.

The system operated chiefly through more than 300 advance bases scattered throughout the world. Into these bases flowed an estimated fourth of the industrial output of the United States, organized by the various technical bureaus of the Navy Department and all coordinated by the Office of the Chief of Naval Operations.

To meet the supply situations, the Navy formed standardized organizations in the United States for shipment to advance bases as complete units. There were functional components covering every conceivable overseas activity essential to the supply network. Each was composed of officers, enlisted men, and material supplied by the various Navy Bureaus. Types of units included harbor defense, fueling, ship repair, communications, base administration, medical, etc.

One of the greatest instruments of naval administration was developed from this conception of assembling advance bases. It was called the "Functional Component Catalogue." From its lists a commanding officer could order exactly the size and type of advance base necessary to support an operation of any special Navy activity.

There were about 500,000 men on duty in advance bases. It was possible to move forward some of the rear bases, a process called "the roll up." But there was comparatively little of this in the Pacific, for most installations were needed where they were originally located—they were part of an ever-increasing network of supply.

The facilities of supply and repair were carried to our most advanced forces through the development of repair ships and tenders—the "train"—the link between the advance base and the front. These ships were as different in type as the variety of combatant and auxiliary ships. There were AR's (repair ships) capable of tending all ships that came alongside. There were AD's for tending destroyers, AS's for submarines, ARG's for all types of Diesel-engine driven ships, ARUs for landing craft repair, ARB's (converted LST's) for battle damage repair, AGP's for torpedo boats, ARV's for aircraft repairs for carriers, and APL's and APB's, barrack ships, to supplement repair forces on the other repair ships.
ROCKETS have been used in wars for as long as seven centuries—in fact, one century longer than guns—so that the principle is no innovation. However, the uses for which the rocket has been adopted in this war are many and varied, including air-to-air, air-to-ground, ground-to-air, antisubmarine, antitank, and ground barrage. Although rockets are being used today for so many varied tasks and are meeting with much success, the rocket is not as yet fully developed and is actually in an experimental stage. Only time will tell what the future holds for rockets, but future wars will probably see the use of bigger and more efficient rockets in ever-increasing numbers.

DEVELOPMENT OF ROCKETS.

Three major Powers have contributed chiefly to the development of rockets of various types; namely, Germany, Britain, and America.

The German type of rocket which has been used on aircraft is a spinner rocket which ranges in size from fifteen to twenty-one centimeters in diameter. These projectiles were originally developed for ground use, as far as we know, and were fired from multiple-tube or rack launchers, in lieu of artillery. At the time the American Eighth Air Force began its famous air drive, the Germans adapted these rockets, principally the twenty-one centimeter, to their fighter aircraft and fired them forward at our large bomber formations. These attacks tended to break up the formations and thus enable their fighters to attack our planes individually.

Spinner rockets are those types of rockets which are stabilized in flight by high rotational speeds similar to an artillery shell. They are not at this date considered as accurate as fin-stabilized rockets for forward firing from aircraft. Although a spinner rocket can be made to fire accurately from the ground, it becomes an increasingly difficult problem to provide enough spin to insure stability in flight when the forward speed of the aircraft is added to the speed of the rocket.

The British developed a 65-inch long, 3.5-inch diameter fin-stabilized rocket originally for antiaircraft use. This rocket, now used as a forward-firing aircraft projectile has a slow-burning propellant powder. Launched from a seven-and-a-half foot rail, the projectile burns for one and a half seconds, accelerating during this period to a velocity of 1,350 feet per second. The RAF is now launching this rocket from fighter aircraft using a shortened rail.

The United States Army Ordnance Department developed a 4.5-inch diameter rocket weighing thirty-eight pounds and utilizing a fast-burning propellant, stabilized by small folding fins, and launched from a tube. The Army Air Forces adapted this rocket to aircraft, using ten-foot steel tubes in a cluster of three under each wing. These tubes were jettisonable by the pilot in flight. Later, lightweight plastic and magnesium clusters were put into use.

The California Institute of Technology, under a National Defense Research Committee contract, developed for the Navy a 3.5-inch diameter fin-stabilized rocket similar to the British type. Lighter, more streamlined rails were used as aircraft launchers. Multiple rails were fixed beneath the wings and created considerable drag. There was constant speculation concerning the necessity for long launching rails and considerable testing was done with short-rail launchers. The "Zero Length" rail was developed consisting of only a front and rear streamlined stud or post which supported the rocket beneath the wing and guided it for only a fraction of an inch of its initial travel. At high aircraft speeds, it was found that the projectile, though free in the airstream, soon after ignition tends to be stable in flight and align itself with the airstream as an arrow does.

The 3.5-inch diameter rocket, as developed
by the California Institute of Technology, had an option of either a 3.5-inch diameter solid steel or a 5-inch diameter high-explosive head. However, with the high-explosive head, a velocity of only 800 feet per second was obtained. Therefore, the 5-inch High Velocity Aircraft Rocket was developed carrying the same high-explosive head. Its speed added to the velocity of the airplane results in an extremely high total velocity, and the rocket becomes a formidable weapon of considerable penetrating and destructive power.

In addition to these aircraft rockets, other rocket-propelled missiles have been used for antiaircraft defense ever since the beginning of this war. The British paid particular attention to their development when it was found that sufficient guns were not available to provide defense against the overwhelming air power of the Luftwaffe. This development was mainly due to the speed of production of rocket launchers as against guns, and not to any expected increase in accuracy. It is possible that the Japanese, with the production of antiaircraft guns decreasing due to our increased air attacks over the Empire, would have resorted to a faster output of rocket equipment.

Although the Japanese were unprepared for rocket warfare when it suddenly became an important factor, there is definite evidence that they were experimenting with rocket-propelled projectiles before they plunged into the war in 1941. Since that time, events have proved the Japanese ready to use rocket weapons in land warfare, at least on a limited scale, and there were indications that improvements in Jap rocket weapons and an increase in their tactical use were to be expected.
Japanese interest in rocket-propelled projectiles may be attributed to the Japanese "theory of the heavy shell" and to the inability of Japan's industry to produce heavy artillery on a sufficiently large scale.

The "theory of the heavy shell," according to Japanese military writing, is based upon the premise that the weight of the projectile is the only means of measuring the effectiveness of the weapon from which it is delivered. Heavy artillery, which is cumbersome and expensive, throws a shell that is only a fraction of the weight of the gun. On the other hand, an equally heavy shell can be thrown from a mortar or a rocket gun which, compared to a heavy artillery piece, is much lighter, more mobile, and cheaper and easier to manufacture. Although heavy artillery can greatly outrange the cheaper weapons, this advantage is offset by the fact that mortars and rocket projectors can be brought sufficiently far forward to engage many targets normally covered by artillery.

In May 1944 the Japanese Chiefs of Ordnance admitted that "it is impossible to supply those types of ordnance which are not available, such as cannon above field artillery class." Undoubtedly this, and the added example of successful Allied and German rocket weapons, added impetus to the development and manufacture of rockets in Japan.

Comparison of Rockets and Projectiles

Rockets are a category of missiles distinct from projectiles. Whereas projectiles are given initial velocity by means of a charge confined in a gun barrel, rockets are propelled by a charge carried in the rocket itself. For a missile to be accurately placed, it is not only necessary to aim it in the required direction, but a means of keeping it traveling straight and true must be included (fin-stabilized and spin-stabilized). In the case of a projectile, direction is obtained by aiming the barrel; the stability in flight is assured by the rotation of the shell about its axis, this being imparted by the rifling of the barrel. Rockets are given direction by aiming the launcher from which they are freed; stability is attained normally by the attachment of a fin tail, although spin-rotated rockets have been evolved and are known to have been in use by the Japanese. Both types of stabilizing have their good and bad points.

Components of Rockets

Rockets will generally consist of a motor and a body. The accessories that accompany these two major components will be the fin, propellant, igniter, and fuzes. Fuzing will be dictated by the mission upon which the rockets are to be employed.

Theory of Rocket Propulsion

The military type of rocket operates in precisely the same manner as does the 4th-of-July skyrocket with which we are all familiar. A rocket of the simplest form consists of a tube which is filled with a propellant, usually a form of powder, and a venturi at the rear through which the burning propellant exhaust gases flow. The head at the forward end contains the "payload" and is usually a steel shell filled with TNT or other high explosive. The propellant is either ignited electrically by means of a squib or mechanically by means of a cap which, with the aid of a black-powder booster, ignites the propellant. The resultant expanding gases flow through the orifice at the rear and, due to the venturi effect, attain a high velocity. The reaction of the gases against the forward wall, and their escaping at high velocity rearward, results in the rocket being driven forward. The velocity with which the rocket moves forward depends on the weight and velocity of exhaust gases and the payload which the rocket motor is forced to move. Hence, our 4th-of-July rocket, though it does not carry much powder, gives good performance, as the payload or head is simply the conical paper windscreen. Unfortunately, this has very little effect on trained soldiers and has extremely small penetration. Consequently, the military rocket carries a steel head for penetration, which, in turn, is filled with TNT to give it greater destructive power. To carry such a payload, it can be seen that more propellant powder must be
burned which results in higher internal pressures in the rocket motor tube. Hence, the motor wall must be strengthened, which, in turn, adds to the weight.

The rearward velocity of the exhaust gases is very high but, due to the large mass of motor tube and the payload, the forward velocity of the rocket cannot be the same as that of the gases flowing to the rear. This difference in velocities is a measure of the inefficiency of the rocket. The 5-inch High Velocity Aircraft Rocket, which is the standard Army Air Forces combat rocket, weighs 138 pounds and requires twenty-four pounds of propellant powder.

The launcher may consist of tubes or racks. Launchers are of two categories: those designed for fixed line or barrage fire, and those to be used for all-directional engagement. This latter type will be required for antiaircraft purposes, although the barrage type could be used with very limited efficiency in any emergency.

**Accuracy of Rockets**

Rockets have not yet been developed to an accuracy comparable with that of a projectile fired from a gun. This is due to several factors, such as the burning of the charge and emission of gases which alter the center of gravity of the rocket in flight. Wind has a particularly noticeable effect on the fin-stabilized type. When the rocket issues from the launcher it is traveling relatively slowly, although accelerating rapidly, and in this condition a crosswind will cause the rocket to swerve upwind as much as three degrees for each ten knots of wind. Slightly bent fins will also tend to inaccuracies increasing with range. Though rockets are inaccurate when fired from the ground, they are much more accurate when fired from airplanes; because of the rapid speed of the airplane through the air, an immediate stabilizing effect is given to the rocket during the initial stages of flight.

**Advantages and Limitations of Rockets**

As there is no recoil, the rocket launcher is of simple construction, and is, therefore, easily produced. Furthermore, it does not require the stable platform of a gun. It is, therefore, ideally suitable for use on small craft, vehicles, and merchant ships where major constructional alterations would be necessary to mount antiaircraft guns of equal caliber.

Another feature of rockets that gives them military importance is the relative lightness of the projector in comparison with a gun firing ammunition of equal weight. This permits fire to be delivered from areas to which guns and howitzers cannot be transported.

Of tremendous importance in considering the advantages of rockets are the ease and cheapness of manufacture of the launcher in comparison with the complexity and high cost of a gun. The rocket launcher is simply a guide, and consists either of a tube or parallel tracks.

Consistent with all weapons, rockets too have certain limitations. The following disadvantages limit the application of rockets:

1. The dangers resulting from the blast of the gases escaping through the nozzle.

2. Decreased accuracy in comparison with a gun.

**Employment of Rockets**

Today, rockets are being effectively employed by various types of projection. The aircraft, the landing craft, the vehicle, and the individual have all provided the launching platform for the launching of rockets.

Rockets are being effectively employed against all types of installations, consistent with the penetrating and destructive power of the rocket used.

The use of rockets for antiaircraft purposes is showing promising developments and it might be well at this point to dwell briefly on that subject.

For antiaircraft purposes the velocity of the missile is the factor which governs the time of flight, so important to the antiaircraft gunner. The longer the time of flight, the more difficult it becomes to estimate the correct amount of "aim off" to hit a moving target. British rockets, used for firing at low-level attacks, have at best a maximum velocity of half the muzzle velocity of the
Bofors 40-mm gun. This factor will, therefore, increase the inaccuracies of rockets when used in the antiaircraft role.

Antiaircraft rockets may be divided into two main categories: first, those used to counterattack below 3,000 feet, and second, those used against high-level bombing. The most effective use of rockets against low-flying airplanes is to produce a high concentration of small rockets fired in salvo. The method of aiming the launcher will be similar to that used for automatic weapons. The British merchant navy has extensively carried out this principle in convoys where a high concentration can be produced and maintained, and much success has been achieved. Loading of rockets is a slow process, as each is separately slid from the front on to the rails and care must be taken that electrical contact is made. For this reason a single rocket launcher cannot keep up a rapid rate of fire. Loading twenty rockets will take between one and three minutes.

Against high-level bombing, rockets, owing to the limitation of accuracy, are used for barrage or predicted concentrations only. Equipment for this use was produced on a large scale by the British Army to strengthen defenses in base areas, as the supply of heavy antiaircraft guns could not meet the demand.

Rockets which eject parachute-suspended cables have also been extensively used.

**Future of Rockets**

As previously stated, rockets are still in an experimental stage, and with improvement in stability, incorporated with radio control, the future of rockets may be revolutionary. It appears from a document captured on Leyte that the Japanese had designed an acoustically controlled “flying mine,” but no reports were received of its being constructed or used.

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**British Monitors**

From an article by Oliver John Harkness in *The Navy* (Great Britain) August 1945.

The monitor is a warship specially designed to attack shore targets, and in the Mediterranean and elsewhere, these ships played an important part.

The main feature which stands out when you first glance at a monitor is the two massive guns in the forward gun turret. Everything else in the design of the ship is subordinated to these 15-inch guns. They are so mounted that they can fire at a high angle, and they have ranges in the neighborhood of 40,000 yards. The other unusual feature about the monitor is its shallow draught, which may be as little as eleven feet compared with the twenty-seven or twenty-eight feet of a battleship with similar guns. That draught enables the monitor to go close inshore and bombard any given target, even if it lies some distance inland from the coast. Moreover, the elevation of the guns throws the shell into the air at a high angle, so that it falls almost vertically on its target and tends to have greater destructive force.

The enormous stretch of seacoast offered by the long coastline of Italy gave the monitors considerable scope in the various Italian campaigns. During the Salerno landing, while destroyers swung in and out battering at coastal targets, the monitors went for heavier German batteries farther inland.

When the last war began, and again in 1939, the Royal Navy was not well equipped with monitors. In fact, until Lord Fisher took a hand, the possibilities of the monitor looked as though they would never fully be realized. Then, under his direction, sixteen were built, went into action, and proved themselves capable of remarkable things.

Today the Royal Navy has four monitors, HMS *Roberts* and *Abercrombie*, and the older *Erebus* and *Marshal Soult*. 
WHAT is a good staff officer? Take your definition of a good staff officer. Does it apply to the Statistical Officer? Yes, it does. If he is a good Statistical Officer he must be a good staff officer, plus the fact that he must have the technical knowledge required of a statistician; but he cannot be a pure statistician. He must be trained in the "common sense" approach to the problems faced by the Army Air Forces. He must not be a "yes" man, as many of his duties consist of advising the commanding general, the chief of staff, and the staff on future operations. Reports are his life.

It is just as important that we know our own situation as it is that we be as familiar as possible with the enemy's. If we do not know just how we stand, we cannot be in a position to take advantage of the information acquired concerning the enemy. In small organizations the good commander can know all his men and all that he needs to know concerning the status of personnel, supplies, and equipment. He will know which men are quick, which are slow, which will loaf on him. He will know whether he has the supplies he needs to run a particular mission. This is not true in larger units, as it is impossible for one man to know all of the needs of his command. There are too many matters to consider, too much advance planning necessary. Therefore the commanding general of an air force must have some means by which he can get a picture of his command, and reports fill this requirement for him if they are good reports. These reports and records, then, are the instruments used by higher headquarters to control subordinate units, and it is the function of Statistical Control to render, interpret, and present these reports.

AAF Regulation 20-11, which sets up the responsibilities and function of Statistical Control, states, in part, as follows: "To provide a standard system for collecting, processing, analyzing, and reporting or presenting to commanders and their staffs in every command echelon current and accurate facts concerning personnel, aircraft, equipment, supplies, operations, training, housing, and other matters required by their own or higher headquarters." Several parts of this quotation are especially significant. Note that a standardized system is called for. Again, the items reported are facts—not a confusing array of statistics, but the end result of them; and also that the responsibility is to report information which is required by their own and by higher headquarters—a two-fold responsibility.

Statistical Control is unique to the AAF. Why do we have it? In the past, each staff section was responsible for securing the reports needed to operate or keep track of the activities with which it was charged. It is obvious that this is a condition which might very well lead to a duplication of information, a very objectionable process which imposes an unjustifiable burden upon lower units who do not have an overabundance of administrative personnel and whose main mission in life is tactical and not administrative. When it was seen that the AAF would grow to many times its pre-war size, it became evident that a new reporting system would be necessary. It became evident also that the need was for a flexible, rapid, and accurate system. Statistical Control was set up, and proved to fill all the requirements specified. Flexibility and accuracy were obtained by the centralized system of reporting, and the International Business Machines provided the speed.

Statistical Control is charged with the job of all reporting, resulting in consistency of reports and in relieving other staff sections of this duty. Under the old system, a junior officer or one just coming into the organization was usually "stuck" with the job of making out reports. This did not result in the maximum accuracy and efficiency. Each reporting officer used a different interpretation of an activity, regulation, or instruction, while the centralized system of reporting
provides a uniform basis for making out reports.

Statistical Control is organized as a separate special staff section and is directly under the chief of staff or the commander, and not under the staff sections. This organization is necessary to insure impartial and unbiased statistical work and uniformity in statistical analysis and presentation. Another reason is that Statistical Control has taken over the reporting activity of many of the staff sections and this type of organization will safeguard Statistical Control from sniping and give it a fair chance to do its job. Statistical Control, by doing all the reporting and by operating without the interference of other staff sections who might desire to influence the facts reflected by a report, produces a single answer which is utilized by all commands in the unit concerned, even up to Headquarters AAF; and this will, in turn, help to produce coordinated planning and thought. Uniformity is further promoted by the use of uniform definitions. For example, each reporting unit will use the same definition of a sortie, so that the results received at the higher echelons will reflect the same answer for all units. If one organization reported each take-off as a combat sortie while another required that the aircraft proceed as far as enemy-occupied territory before a sortie was counted, you would receive very different figures from the two of them.

Statistical Control is not an agency for the use of the commanding general or the chief of staff alone but is there to serve every activity which can make use of its facilities, and there are very few who cannot. The Statistical Officer should be used by all, because he is an expert in his line and the handling of statistics is a matter requiring skill and experience.

In order to have the most efficient reporting system, it is necessary that those persons who will use the reports make their desires known. It is the obligation, then, of the various staff sections to tell Statistical Control what the requirements are. Statistical Control will, in many cases, anticipate the needs of the staff sections; but never can that replace the studies and planned recommendations of the staff sections. Statistical Control will perform the technical task of preparing the reporting forms and the instructions to be followed in completing the forms, and will determine how often the forms will be submitted, by what channels, and with what means of communication. Statistical Control is the one place where all reporting requirements are centrally made known; therefore many of the requirements from the different staff sections can be consolidated on one form. This eliminates duplication of activity in the lower echelons and will result in a simplification of their administrative work. Statistical Officers are trained in the process of receiving information in the most efficient manner possible, and the forms recommended by them will often be easier to complete and will, even so, give better information than a more complicated report dreamed up by an inexperienced person.

Statistics for control purposes are essential if the aim is to have intelligent guidance of the activities of the command. A-1 furnishes a good example of control statistics. The Statistical Officer goes into A-4’s office with two line graphs, one showing no decrease in operations, the other showing a gradual decrease in stock levels. If A-4 finds it impossible to increase his flow of supplies, he must recommend suitable action to avert the approaching disaster. The system works the same when applied to A-1 for his replacements.

Statistical Control is extensively used in advance staff planning. Staff planning, particularly at the higher echelons, is a long-range proposition. Based on the ends desired, estimates of the effort required to reach those ends, and the personnel and matériel available, the program will be set up. The aircraft and combat crews going into the Pacific were not handled on a hand-to-mouth basis, but flowed in on a regular schedule which was set up some time in the past. We do not produce crews, planes, or supplies rapidly enough to live from day-to-day. Plan-
riers must know in advance what they can count on—not take the chance of the field forces getting halfway through an operation and suddenly discovering that they are short critical items. This long-range planning requires some factual basis on which to operate, some estimate of the requirements for a contemplated operation or series of operations. How are these requirements estimated? It is done in just as businesslike a manner as possible. A life insurance company is a fair example of the same sort of problem. This company is selling policies in the present, based on the number of persons in a sample group who will die in the future at a predictable rate per year. The life insurance companies are able to make a very accurate prediction of this future mortality, based upon past experience. A large mass of figures, known as an experience table, through statistical analysis leads to definite conclusions as to the expectancy of life of an individual, or, more properly, a group of individuals. A factor has been arrived at which, when applied to your age, produces your life expectancy and in turn establishes your insurance rate—that amount which the company can charge and still come out even, plus loadings which are made for expense and profit. In planning for a tactical operation, practically the same process is followed. Based on past figures relating to crew mortality, aircraft attrition, expenditure rates for supplies, and the like, a prediction is made as to future requirements. Allowances must be made for any peculiar local conditions, but with adequate past experience a set of factors can be quite accurately produced which, when applied to a given effort, will give a good idea of the needs for the future operation. It must be kept in mind that these results are an average, and will not apply directly to a short-range operation such as one day's operation or mission. For instance, it was estimated that crew mortality would be about four percent per mission. Any one mission might conceivably be as high as twenty-five percent, but in the long run, over a period of time, it would tend to average out very close to the estimated four percent. This will obviously give us the jump on old man Time, bringing the future to the present without the passage of time.

There is no basis upon which to estimate Statistical Control's part in the present war. When it was put to work some four years ago, it was not too well received by the operating units, who looked upon it as just another administrative obstacle to be bypassed whenever possible. The credit for changing all this belongs to Statistical Control itself, and to the Statistical Control Officers who made possible the successful adoption of this system of reporting. It will be well to watch Statistical Control closely in the future, as it may very well come to play a larger and larger part in military operations.

War and battles are governed by laws which are as invariable as they are eternal. The new weapons and means which ceaselessly make their appearance modify their superficial character only, never their essence.

—from Colonel Frick's Tactical Breviary, quoted in Revue Militaire Suisse.
Japanese Psychology and its Effects Upon the Training of U. S. Troops in Pacific Ocean Area

BRIGADIER GENERAL KENDALL J. FIELDER
Assistant Chief of Staff, G-2, Pacific Ocean Area

This article was written while fighting was still in progress in the Pacific.—THE EDITOR.

The combat training of Army troops in mid-Pacific has been dictated largely by two elements, the topography and the characteristics of the Japanese fighting man. These elements are not independent problems for separate consideration. They are closely bound and often blended indistinguishably into a single problem whose solution might depend on a division commander or an infantry squad leader.

The Pacific Ocean Area (POA) itself contains groups of islands which have little in common, topographically. Some are saucer-shaped, flat, treeless, and fringed by treacherous reefs. Others are heavily jungled, volcanic, or with heavy coral deposits, sheer cliffs, swamps, forbidding jungle, and hundreds of natural caves. So in our advance from Makin to Okinawa, only the most general lessons could be applied to succeeding campaigns. Each invasion had problems peculiar to itself, a fact which made each assault an almost entirely new operation.

Then there is the Japanese soldier, with an unshakable faith in his invincibility and his arms. He is highly trained, well equipped, and religiously committed to kill as many Americans as possible before he is slain. His philosophy as a soldier seems almost to
subordinate victory to death on the battlefield. And because he feels the gods have selected him to die, he fights with a fury which makes even the casual Japanese soldier the equivalent in fanaticism to the German SS trooper.

The topography itself and the scarcity of troops as compared with other theaters prohibited training of specializing divisions, as in the European Theater of Operations. Every division in POA had to be prepared in the shortest possible space of time to fight over every type of terrain, to keep the enemy back on his heels and unable to strengthen fortifications of islands falling clearly before our advance. So rapid and efficient has been this Army training that troops storming the Palau found unassembled Jap beach defense guns in their invasion path.

How, considering the scope and complexities of jungle and amphibian warfare, has this schedule been met? Principally by streamlined, concentrated training and in-

Hand grenade explodes as jungle training students assault a Japanese village in the Jungle Training Center, Oahu, T. H. (U.S. Army Signal Corps photo.)

doctrination at the headquarters training area of the POA army command.

Immediately upon assuming command of all Army forces in POA, Lieutenant General Robert C. Richardson, Jr., outlined a highly accelerated training program for forces then occupied with purely defensive assignments in the Hawaiian Islands.

The termination of the Guadalcanal cam-
campaign after six months of bloody fighting showed us to be in much the same position as the British regulars found themselves when they faced Andrew Jackson’s “Long Rifles” in the battle for New Orleans. Jungle warfare placed severe handicaps on the use of artillery, mortars, and tanks. Warfare as we knew it did not exist in the southern regions, nor, as we later found out, could the greatest mass of sea and air power re-

place the infantrymen in the final assault on the enemy.

Japanese troops went into action lightly equipped and supplied with such items as head nets, camouflage capes, ropes, and a light or “ni” mortar which could be fired by one man. He depended on infiltration to upset our defense perimeters and filtered through our ranks to harass an advance. These movements were usually executed by small groups and proved much more serious and demoralizing than an outright Japanese counterattack. On the basis of the 25th Infantry Division’s lesson, FOA began shaping its first definite training procedure as it applied to the war against Japan.

The answer did not lie in training men for violent hand-to-hand fighting, the type in which Commandos specialize. The solution was the adoption of the basic Japanese principles of jungle warfare, dictated largely by Japanese psychology, then the improvement of these. As a result, the subsequent months saw an immediate increase in night problems and patrol work, improvisation in the field and improvement in camouflage, combat swimming, and swift, sudden thrusts by smaller infantry units, as well as thoroughly teaching as much as was known of what the Jap soldier thinks and how he will react.

The terrain of Oahu lent itself to the training of troops for combat in the Pacific. Sliced with deep gorges, with high cliffs, exposed plains, beaches, and jungle-matted areas, the island was able to duplicate almost every beach and area scheduled to be hit by our Army divisions. By utilizing these local areas, General Richardson was able to give his troops a “preview” of nearly every battle ahead.

This was accomplished in the main by intensified amphibian training and the opening of a Unit Jungle Training Center on...
Oahu which to date has graduated more than 250,000 students.

Here men trained in mud, in heat, and in the rain, “fought” through jungles and over mountains, and hit beaches. Archaic approaches to training were thrown out, revolutionary methods were substituted, and much greater emphasis was placed on responsibilities of smaller unit commanders. On Monday, was reprimanded for an error which, if committed in battle, would cost his life. Teachers and students worked and lived together, and combat endurance was developed gradually on the theory that an exhausted man makes a poor student.

Many instructors at the center were detailed to accompany rifle units into combat to gain first-hand knowledge of problems encountered in action and new developments in enemy tactics, and to look for trends in Japanese defense methods. These findings were speedily incorporated into the comprehensive but still flexible course, which in many cases was dictated by the experience of the famous divisions the school had trained.

The value of this training on all types of terrain was seen in an early phase of the battle for Guam, where one regiment in the 77th Infantry Division was pushing up the exposed slopes of a mountain ridge to bisect the island, units of a second were in fierce trench warfare on a rocky peninsula, while a third was preparing to sweep through the...
swamp and jungle blanketing the northern portion of the island.

One of the school's most notable graduates was the 7th Infantry Division, which entered the course in the Hawaiian Islands after winning the battle of Attu. A few months later, the Seventh stormed Kwaialein Island in the Marshalls Group, achieving what was described as "an epic in atoll warfare."

A secondary school, an adjunct of Pacific Combat Training Center, formerly the Jungle Training Center, is the Survival Lore School, in which soldiers are taught to live off the lean of the land if separated from their units. Here the flora and fauna of the Pacific is studied, and men learn to make edible salads of wild vegetables; clothing, shelters, and even bandages of jungle brush; and how to reduce chances of becoming ill through infection or food poisoning.

Students at the Amphibian Warfare School, which has graduated undisclosed thousands, are concerned chiefly with the use, operation, and maintenance of landing craft involved in Pacific operations. Courses and exercises with "ducks, weasels, and alligators" are given to the troops. Assault landings are first studied by theory and diagram, after which classes take to the surf off Waimanalo Beach to familiarize themselves with the vehicles. Classes hitting the beaches are guided by shore-based instructors, who, using a public address system, perfect formation and attack methods on the spot.

Instructors have erected a life-sized model of a troop transport, to teach students the safe, proper use of the cargo landing net and how to descend into landing craft in rough seas.

The very nature of Pacific warfare, in most battles calling for employment of regimental combat teams within divisions, has resulted in giving experience in combat to every regiment in the POA. In the atoll campaigns, divisions fought mostly as separate regiments. Even these regiments were broken into small task forces, to cut into still smaller islands to destroy Japanese holding forces. These attacks enabled every man in these assigned forces to receive experience in combat where in larger units he might have been committed to an inactive sector or held in reserve.

It has often been pointed out, at times too pessimistically, that "the bulk of the Japanese Army has not been touched." But
it is nonetheless true that Japan has lost an estimated half a million men in the Pacific, the majority of them destroyed in combat while American units have remained comparatively intact throughout the fighting. Today, scarcely a division in the Pacific has not been through at least two campaigns. The nature of the Japanese soldier likewise dictates something different in the way of training our troops to meet him. He is so imbued with his reverence for the Emperor, from whom he believes all orders emanate, that he is willing to carry out instructions religiously. He is not clever, has very little initiative, but is probably the most intensively trained human fighting machine in the world. He is, in general, unpredictable.

Giving men the most intimate possible picture of how the Japanese soldier thinks is still POA's most difficult task. This is chiefly due to the chasm between the Oriental and Occidental mind. It has been stressed, however, that the responsibilities of the Japanese soldier do not end with the physical defeat of his organization in the field, that he does not subscribe to the classical conceptions of warfare.

Soldiers are continually urged to remember that wherever their Japanese enemy may be, he is going to fight. Enemy soldiers stranded behind American lines for months have often emerged suddenly for a one- or two-man sortie into an entire American garrison. For this reason, troops are trained to rely upon themselves as individuals to thwart such erratic Jap thrusts. The enemy,

Making it hot for the Nips. A flame-throwing tank of the hard-hitting U.S. Tenth Army pours it on a Jap entrenchment on Okinawa while doughboys take cover and wait to go in and mop up any remaining Nips. (U.S. Army Signal Corps photo.)

Thus while units within a division have often fought hundreds of miles apart, the units have been rejoined, making the division become a completely war-tested unit.
soldiers in the Pacific know, frequently con­ceal grenades in their armpits, or play pos­sum to lure a patrol into range of Japanese machine-gun fire.

Infantrymen in General Richardson's com­mand were amazed by reports from the Eu­ropean Theater of Operations that "small groups of 100 prisoners had been captured," while surrender of entire army divisions was inconceivable to an American pressing a war of annihilation against soldiers of perplexing, unfathomable philosophies. The real Japanese soldier has been deeply impressed with the abiding dishonor of surrender. The rest are convinced that only slow torture awaits those who give up. So surrenders are still extremely rare in Pacific fighting.

Replacement facilities in the Pacific Ocean Area's command have expanded enormously. The first contingents of men from mainland replacement centers began arriving for training here well before General Richardson's troops began striking west across the Pacific toward the Philippines and the Ryukyus. Men comparatively new to the Army received the benefits of being trained in a combat zone, where the atmosphere of war, the abundance of battle-tried units, and the Army general hospitals lent to the seriousness of their training. By the time these men were assigned to combat units, they were well versed in Pacific topography, acclima­tized, and informed on the latest Japanese battle procedures.

On Leadership

Extract from a letter to the Editor from a division commander in the European Theater of Operations.

As for leadership, it is obviously most essential that all members of the team must believe in the signals. It is equally obvious that all soldiers must know WHY they are doing WHAT. This necessitates competent signal callers who know their jobs. They must have sufficient leadership to assure that each member of his team, whether it be a squad or a division, has the utmost confidence in the capabilities of his leader for calling the right signals.

It seems equally obvious that any combat unit must be thoroughly disciplined, which necessitates the highest degree of teamwork, must be physically fit, and above all must have an intense belief in itself.

I do not mean to be uncooperative in failing to give you a more lengthy article on "Aggressive Leadership of Junior Officers," but frankly I think there is too much said about it already and too little done about it.

Joe Stilwell summed up the needs of tactical direction and leadership by the term, "Sing something simple."

Nothing proves discipline so well as the fulfilling of orders received.

—General José de San Martín, quoted in Revista Militar, Argentina
ONE of the major functions of a staff officer is anticipatory planning, wherein the officer attempts to visualize and anticipate the difficulties which will arise within the scope of his responsibility and plans the necessary action to be adopted where and when needed to overcome these difficulties.

In order that his plan for future operations will be sound and workable, it must be based on a consideration of the facts as they exist in the present situation. For this reason, considerable stress has been placed on the necessity for making a timely and proper estimate. The estimate is a vehicle designed to carry the thought process through a logical sequence of steps leading towards a conclusion. The conclusion reached should be the action to be adopted to overcome the difficulties anticipated in future operations.

One of the major jobs of the G-3 of a communications zone will be to prepare a plan for the defense of the installations within the communications zone, and after the plan has been approved, to supervise its execution. Therefore, G-3 must attempt to anticipate the difficulties and decide what must be done to overcome these difficulties. In other words, he must make an estimate.

Since this estimate is based on preparing a plan for the defense of the communications zone, a discussion of our defensive doctrine as it applies to the communications zone should be in order before discussing the elements of the estimate itself.

“Our defensive doctrine contemplates the organization of a battle position to be held at all costs, and the use of covering forces to delay and disorganize the advance of the enemy and deceive him as to the true location of the battle position” (FM 100-5, paragraph 579). Since the communications zone will not have sufficient combat troops to man a continuous battle position, as will be found in the combat zone, and because the SOS units organic to the communications zone should not be diverted from their primary mission, it becomes necessary to prepare the battle positions for defense and hold the combat units, which are to occupy the positions in an area, located so that they can occupy the position with a minimum of delay in case of an enemy threat.

Before the battle positions can be selected and prepared it will be necessary to determine what is to be defended. For this reason a study should be made to select those vital areas and installations within the communications zone which, if the enemy should capture or destroy, would seriously interfere with the accomplishment of the mission.

In order to make the maximum use of combat troops assigned to communications zone for defensive missions, it may be necessary to establish priorities on all the vital areas in order of their importance. Battle positions can then be selected and prepared in such a way as to defend these vital areas. It was mentioned earlier that SOS troops should not be diverted from their primary mission (the operation of their respective installations). They should, however, be prepared to defend their own installation. Thus we see that there will be a series of strong-points throughout the communications zone centered around each installation, and in addition the area of the communications zone is organized for defense on a territorial basis with the tactical commander of the combat troops providing the general defense of the installations within his area of responsibility. The success or failure of this defensive system is dependent in a large measure upon security. The purpose of security is to give all commanders sufficient time and space to dispose their troops so as to counter any hostile threat. Since the positions are organized but not occupied, it is necessary that the commander have information of a hostile attack in sufficient time to allow the troops to occupy the positions. So adequate warning systems should be estab-
lished with good communications. All possible steps should be taken to gain timely information of enemy movements. Coordination should be made with the Air Forces and with the Navy to utilize their facilities for obtaining timely information of a hostile approach from the air, sea, or ground.

G-3 will be familiar with this defensive doctrine and will be charged with the responsibility of preparing a plan incorporating the principles of defensive combat for defense of the communications zone. Before the plan can be sound and workable, G-3 must prepare an estimate.

The estimate is not necessarily the plan, but rather a consideration of the factors in turn which will affect the plan. The plan is then based on the conclusions reached as a result of the estimate.

The elements of the estimate will include: a consideration of, first, the mission. The mission of the communications zone will be generally the same in any situation, that is, the uninterrupted logistical support of the theater of operations. This means that the communications zone will have to establish the installations and communication lines to support the theater logistically, and in addition prepare to defend these establishments against any ground attacks, including sabotage.

It will be the responsibility of G-4 to plan the logistical support, but it will be the responsibility of G-3 to plan the defense of the installations.

The second element of the estimate to be considered is the present situation. Since G-3 is responsible for making a plan for the defense of the communications zone, he must consider the present situation as a basis for his planning. The situation will include the following facts which will have an effect on the defense plan: First, the location of the front lines. These are the people who are in contact with the enemy and who will furnish communications zone with most of the information regarding enemy activities. Second, the boundaries of the communications zone, which indicate the area for which G-3 is responsible. Third, the status of troops located in the communications zone. These troops will consist of both combat troops and SOS troops. There will be some combat troops located in the communications zone but they will not be under communications zone control and cannot be used on defensive missions without permission and approval from theater. There will normally be combat troops assigned to communications zone to be used for defense. Under the policies laid down by the theater commander, the communications zone commander may be given authority to employ any or all combat forces in the communications zone for defense.

Because of their type of organization or their organic equipment, some SOS units cannot be used on defensive missions. For example, medical units are not even equipped with weapons and therefore cannot be considered for use in the defense plan. On the other hand, most SOS units are equipped and trained to fight and should be figured in the defense plan.

At any rate, G-3 must determine just what troops or units are available and where they are located. These are the tools with which G-3 of the communications zone has to do his job.

The fourth factor to be considered under the situation is the probable effect present combat operations will have on the communications zone. They may result in a change in the communications zone boundaries which would change the area of responsibility, thereby affecting the defense plan.

The third element of the estimate is a consideration of the defensive measures to be taken against an airborne attack, a seaborne attack, a ground attack, and an air strike. These enemy lines of action are not necessarily enemy capabilities, but rather all possible ways that the enemy can launch an attack. Any or all of these lines of action may be capabilities, but it will be G-2's function to determine just which are capabilities and which are not. It is obvious that the enemy can only launch an attack by the use of airborne troops, or by an amphibious operation, or by launching one of the variations of ground attack, or by making an air
strike. G-3 will attempt to determine what should be done to defend the communications zone against each of these possibilities, G-2 will determine just which are capabilities, and the plan to be adopted will be a command decision.

In determining what defensive measures should be taken against each possibility, G-3 must follow a definite procedure. He must determine the vital areas which are most likely to be threatened by each line of action open to the enemy. He will consider each action separately and make an estimate as to what defensive measures are to be taken in each case. If the enemy makes an airborne attack, he must have landing areas. If he is to make an amphibious landing, he must have landing beaches. If he is to make one of the variations of a ground attack, he must have a route of approach sufficient to support an operation large enough to cause a penetration in our front lines or to make an envelopment around an open flank. By a thorough study of the map and by reconnaissance, G-3 will determine where all the landing areas, landing beaches, and approaches are on the ground. He is then in a position to estimate the defensive measures necessary to defend the vital areas within the communications zone against any and all attacks. These defensive measures will consist of the number and type of units necessary, the extent of fortifications, the demolitions and battle positions which must be prepared, the assignment of areas of responsibilities or the amount of decentralization necessary, and the strength and location of reserves.

Theater will normally provide active air defense, but this does not relieve communications zone of the PAD measures which must be taken.

The fourth element is the conclusion. After considering all these factors, G-3 is now ready to make a recommendation. His recommendation should include the preparatory measures to be taken for defense, and what additional troops if any will be required to defend the communications zone adequately. The defensive measures which he recommends would include the assignment of areas of responsibility to subordinate commanders, the strength and location of reserves, the extent of demolition, fortifications and battle positions to be prepared, and finally his plan for coordinating the defensive measures into an integrated defense plan.

The estimate should be made as complete as time will permit. Normally, in the communications zone, G-3 will have sufficient time to make a detailed study of all the factors before arriving at a conclusion. However, on the other hand, conditions can be visualized where it will require a rapid mental estimate. The estimate may vary from a long, carefully prepared document to a short mental estimate. Regardless of whether it is long or short, or whether it is mental or written, G-3 should direct his thinking in such a way as to consider each factor step by step to insure that he give each factor due consideration before arriving at a conclusion to be recommended. This is the only way he can submit a sound and workable solution based on the facts in the situation.

The following form is an outline of the factors which G-3 should consider in making an estimate. This form is not found in any of our field manuals but is merely a suggested manner or procedure for G-3 to follow.

G-3 Estimate (Defense—Communications Zone or Section of the Communications Zone)

1. Mission
   (To provide for the uninterrupted logistical support of the theater of operations.)
2. Situation
   a. Location of front lines.
   b. Boundaries of communications zone (area of responsibility).
   c. Location and strength of units in communications zone.

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*PAD originated from “passive air defense.” However, at present it entails more than what is commonly thought of as passive air defense measures. The PAD officer is an assistant to the G-3, and his responsibilities include the planning of measures to minimize the effect of enemy air raids, delayed-action mines and booby traps which may have been left in the area by the enemy, long-range artillery fire, naval gunfire, and fire defense. He also heads up and controls the organization to combat the effect of these types of enemy action.
(1) Combat units—status of each with respect to communications zone.

(2) Communications zone units which can be employed for defense.

d. Probable changes in boundaries of communications zone as a result of present combat operations.

3. DEFENSIVE MEASURES

a. Consider defensive measures against any of the following enemy actions which may be applicable.

(1) Airborne attack. Consider the following factors:
(a) Probable objectives.
(b) Possible landing areas.
(c) Approaches to each probable objective from landing areas. Consider: terrain (observation, cover and concealment, obstacles); roads (extent, type, bridges, defiles, trafficability).
(d) Local defense available for each probable objective.

(2) Amphibious operations (landings in force, raids). Consider:
(a) Probable objectives.
(b) Possible landing beaches.
(c) Approaches to probable objectives from landing beaches. Consider: terrain (observation, cover and concealment, obstacles); roads (extent, type, bridges, trafficability).
(d) Local defense available for each probable objective.

(3) Ground attack.
(a) Penetration of combat zone. Consider:
(i) Probable objectives.
(ii) Terrain.
(iii) Critical areas.
(iv) Roads.
(v) Local defense available for each probable objective.

(b) Envelopment. Consider:
(i) Probable objectives.
(ii) Terrain.
(iii) Roads.
(iv) Critical areas.
(v) Open flanks.
(vi) Local defense available for each probable objective.

(c) Large-scale civilian uprising.
(i) Probable objectives.
(ii) Civilian organization, underground.
(iii) Local defense available for each probable objective.

(4) Air attack. (If air defense is assigned to communications zone.)
(a) Probable objectives.
(b) Nature of attacks.
(c) PAD measures necessary.

b. Consider the following factors under each of the above-mentioned possible enemy lines of action:

(1) Units available.
(2) Units required.
(3) Preparatory measures.
   (a) Assignment of mission and areas of responsibility for defense.
   (b) Strength and location of reserves.
   (c) Coordination of defensive positions, demolitions, and other fortifications for defense.

4. CONCLUSIONS

Based on the above factors the following plan is recommended:

a. Immediate preparatory measures to be taken for defense of the communications zone.

   (a) Sectors of responsibility, and troops assigned to each for defense.
   (b) Reserves, strength and location.
   (c) Defensive positions, demolitions, and other fortifications for defense.
h. Additional troops required for defense of communications zone.

The form outlines the steps or factors which G-3 of a communications zone or section in the communications zone should follow in his thinking in planning for the defense of the communications zone. The form, if followed, is designed to insure that G-3 will give due consideration to all factors which will affect the situation, before he arrives at a conclusion or line of action to be recommended to be taken for defense of the communications zone.

The Jap

Digested at the Command and General Staff School from an article by Colonel A. G. Foxx in The Infantry Journal.

The Japanese high command probably understood the tactical employment of the combined arms, but deficiencies in armament and equipment generally prevented their decisive employment. In no way did the Japanese possess superiority in fighting equipment over American forces.

The Japanese concept of war exploited to the fullest extent the ancient law that the human element is decisive. Hence the infantryman was the heart and soul of Japanese military power. The Allied Armies considered this concept basically sound but requiring modification to take advantage of scientific invention and the present industrial age.

The capabilities of the foot soldier constituted the strength, and his deficiencies the weakness, of the Japanese military machine. He was not as adaptable to new situations as the American soldier. A creature of habit, he did things best that he had done over and over again. His basic training had been exceptionally thorough. The Jap soldier used his basic weapons efficiently, so well, in fact, that he was able to accomplish more than might have been expected or predicted. His camouflage, concealment, reconnaissance, and the employment of ambushes, patrols, and raiding parties were superior.

The Japanese ability to move sizable forces of foot soldiers through jungle and over rugged terrain was truly remarkable. The explanation was to be found in thorough basic training of the individual, his rugged physical condition, and his extremely frugal requirements.

The Japanese is offensive minded. His attacks were daringly planned and executed. His reliance upon the human equation with corresponding deficiencies in matériel often made his attacks weak in firepower—too weak to overcome the matériel advantage of the Allies.

The Japanese was master in the art of terrain appreciation and utilization. The stubborn and sustained defensive powers of small units were the hardest side of Japanese warfare to deal with and to overcome. Superior defenses of small units contributed more to the combat effectiveness of the Japanese ground forces than all other tactics combined.

The Japanese husbanded his limited artillery and tanks but occasionally employed them with boldness and cunning. He recognized the Allies' artillery superiority and attempted to overcome this by employing every conceivable ruse to protect his own artillery pieces, even to the extent of firing only when the maximum effect could be achieved.
The Okinawa Campaign

Colonel Conrad H. Lanza

THE Ryukyu Islands are a chain uniting Kyushu, the southern main Japanese island, with Formosa (Figure 1). The air distance between these two places is some 700 miles. The Ryukyu Islands are in advance of the air line. Like all other island groups which lie the east Asia coast, they have steep slopes, the round islands have but limited military value.

The long islands consist of two or more volcanoes, each of which has the characteristics of the single-volcano round islands but which have become connected with each other. The connection in width is equal to

form an arc whose center is to the west. Measured along the arc, the distance between the northernmost and southernmost member of the group is about 750 miles.

The Ryukyus are volcanic islands. The smaller ones are round, being usually a single volcano surrounded by the debris of eruptions. Due to the action of the sea, the outer edge is often worn away, forming bluffs. For this reason, and because they are small, and further because they usually that of the volcanoes, and consists in part of volcanic material and sometimes in part of coral formations. The connecting areas are relatively low and generally consist of concentric plateaus affording considerable flat surfaces. The long islands generally have beaches, form good sites for airfields, and have a distinct military value.

The Ryukyus are divided into three geographical groups, north, center, and south. The north group is within 125 miles of
Kyushu; the south group lies from seventy-five to 225 miles east of Formosa. The central group is 250 miles long. Its southern island is Okinawa, at the center of the Ryukyu Group, the other islands of the center group being north of the geographical center.

Okinawa (Figure 2) is about seventy miles long. It had at one time numerous low volcanoes. These have long since ceased to be active and are broken down. It is rather densely populated and is well cultivated. Just north of the center is a peninsula pointing west, and here the island is twenty miles wide. Elsewhere it varies from two to ten miles. There is no place which is over five miles from the sea, and all areas can be shelled by warships.

The principal town is Naha, eight miles due north from the south tip of Okinawa. It lies on a bay on the west side and was a small Japanese naval and air base. Numerous villages line the coasts and are connected by a Japanese type road—narrow.

Okinawa was desired by the American high command for use as a base for operations against the main Japanese islands. It was to be a supplement to Iwo, which was a very small island 750 miles from the nearest point of Japan. Okinawa was 450 miles from the center of Kyushu, 575 miles from the center of Shikoku, and 925 miles from the Kwanto Plain on which Tokyo is located. Okinawa was large enough to afford sites for numerous airfields upon which correspondingly larger air forces could be maintained than at Iwo.

Why the High Command selected Okinawa rather than some other island closer to Japan is not known. Amami O and Kikai are Japanese air bases 150 miles closer to Japan. Kikai is a round island with difficult coasts to land on. Amami O is a long island and a naval and air base. Within twenty-five miles of Kyushu is Tsuuga, also a long island. It is presumed that the High Command considered all possibilities, and decided for Okinawa on good and sufficient grounds.

It was known that Okinawa was fortified. The garrison was believed to be about 65,000 to 70,000 men, including services. Naha was fortified and it was assumed that the enemy would defend the beaches, which policy would entail a certain scattering of available troops. It was decided to land on the west side of the island ten to twelve miles north from Naha. There was a good bay and beaches and it was on the lee side where the seas were smoother.

The Pacific Fleet Command was assigned
the mission of capturing Okinawa, and was given the Tenth Army. This consisted of the III Amphibious Marine Corps, with the 1st, 2d, and 6th Marine Divisions; and the XXIV Corps, with the 7th, 27th, 77th, and 96th Infantry Divisions. Strong air forces were attached. Including the usual corps and army troops, and services, the total invasion strength was around 150,000 men, or double the estimated strength of the enemy. The naval forces employed have not at date of writing become known, but appear to have numbered well over 100 combat ships with numerous ships in the train. In all, at least 250,000 men were employed in the task.

Preliminary operations commenced on 10 March 1945. The 5th Fleet, with a fast aircraft-carrier force, attacked enemy air and naval bases, from which hostile planes might fly to interfere with the prospective operations around Okinawa. This covered other Ryukyu islands, Kyushu, and the Inland Sea. This phase of the operations lasted through the 23rd. The fleet then moved from off Kyushu to off Okinawa. The latter island was now subjected to what was believed to be an unparalleled naval shelling and air bombing, intended to destroy all enemy fortifications and utilities. This continued through the 31st.

On the 25th, Kerama was shelled. This is one of a group of islets about twenty miles from Naha. On the 26th, the 77th Infantry Division landed on Kerama, which was defended by a garrison of about 900 men. These were overcome, and squadrons of Marine planes moved ashore and established bases from which fighters could cover the approaching landing on Okinawa. The preliminary operations were completed on 31 March, with relatively light losses on our part. There had been no enemy naval reaction and but limited air reaction.

In the meantime, the Japanese commander, noting the tremendous shelling and bombing of Okinawa and advised by his air reconnaissance of the number of warships in the vicinity and of the reported transport fleet of some 100 landing ships, had realized that invasion was coming. He seems to have had about 65,000 regular troops, as estimated, but he had reinforced these by drafting available men from the local population. This gave him another 30,000 men. Some of these were used only as labor troops but they released regular soldiers, so that the total combat strength came close to 70,000.

The Japanese commander, possibly on instructions from higher authority, elected not to contest the beaches, as the naval strength and gunpower of the American Navy, supplemented by overwhelming air force, made beach defense impracticable. A small force was detailed to watch the beaches and fight delaying actions. Other troops were concentrated at the south end of the island for a primary defense of a line five miles long astride the island and facing north. There were no good landing beaches in rear of this line,

Due to this disposition of the Japanese forces, which were not at the time noted, the invasion, which followed a terrific air and naval preparation, went off on 1 April very smoothly. Neither did any serious resistance appear within the next few days. The two corps effected their turns as contemplated, and made slow but relatively easy progress respectively to the north and south.

The lack of opposition appears to have misled the troops. It was believed that the enemy did not contemplate vigorous fighting. In view of this situation it was thought that the invading force was larger than necessary. The 2d Marine Division was therefore relieved as not needed, and returned to a distant base. This left six divisions. Of these, two each faced north and south charged with clearing their ends of Okinawa, one was still on Kerama, and one was in army reserve.

On 7 April a Japanese naval force of one battleship, one cruiser, and about nine de-
destroyers sailed south from Kyushu towards Okinawa without air cover. The mission of this force is unknown, since the Japanese themselves estimated that the opposing American 5th Fleet had ten battleships and a corresponding number of other classes of warships. American planes attacked the Japanese ships before they had gone fifty miles and sank the two larger ships and three of the destroyers. The remaining destroyers went back. Then the Japanese air force came out. They got through to the 5th Fleet and caused minor damage. In all, only seven American planes were reported lost.

On shore, the XXIV Corps had arrived in front of the enemy's first line of resistance, recognized as strong and requiring a formal attack. The Marine Corps was just south of Motobu Peninsula against enemy delaying forces.

On 8 April the XXIV Corps with two divisions in line (27th and 96th) attacked southwards. In an all-day fight, less than a quarter of a mile was gained on the left, and not half as much on the right. The enemy had strong artillery which could not be silenced in spite of complete air control and aid of the guns of the fleet. The attack continued next day.

The enemy's line was a straight five miles across the island from Machinato to Yonabaru, following a ridge. There were minor ridges in front held as advanced positions. The natives of Okinawa bury their dead in caves hollowed out of the sides of the ridges. The Japanese improved the caves on forward slopes by enlarging and connecting them by tunnels and installing machine guns and batteries. Caves on reverse slopes were remade into assembly positions for reserves. When attacking infantry reached certain crests on the 9th, the Japanese artillery shelled the crest so heavily that a withdrawal was forced. Thereupon the Japanese local reserves emerged from nearby caves, and reoccupying the crests, counterattacked using grenades and supported by their artillery.

The enemy's main position appeared to be the high ground about Shuri, near the center of his line. It was decided to make this the main objective of attacks, and it was subjected from now on to daily extraordinarily heavy artillery and air attacks. The method of attack was to form combat groups of a tank plus an infantry escort. This was slow work. The enemy had antitank ditches, mine fields, and antitank weapons, forcing advances to be made cautiously. In the following week only a few hundred yards were gained. By the 18th the Marine Corps had eliminated enemy forces in the northern part of Okinawa, and had occupied Ie Island just west, and useful for its airfield. The corps passed to army reserve.

On 19 April the XXIV Corps, with the 27th, 96th, and 7th Infantry Divisions in line, attacked following an unexampled artillery preparation by army and corps artillery, including the Marine Corps artillery, and by the entire fleet. There was heavy air cover. The flanks in an intense all-day battle gained from a quarter to a half a mile. Less was gained in the center.

This battle continued daily to include 27 April. Every day there was an artillery preparation, the fleet firing about 1,000 tons of ammunition each time, often against rather small areas. In the entire battle of nine days, the maximum gain was a mile, and generally it was less. The average daily American losses on land during these days was 913, as compared to an average of but 177 a day for the period 1 to 18 April.

A reorganization was now made. Two divisions—the 27th and 96th—were withdrawn from line and replaced by the 1st Marine Division and the 77th Infantry Division. The Marines took over the right, and the III Amphibious Marine Corps divided the front with the XXIV Corps, which was on the left.

The American estimate of the situation was that although progress on the ground had not been extensive, the enemy's losses, based on known dead, indicated that about one-half of the Japanese force had been destroyed, or say 40,000 men, as against own losses of under 12,000. It was con-
sequently believed that in about one more month there would be no enemy left. It was recognized that the enemy's positions, based on innumerable caves, were strong, and that spectacular advances were not to be expected.

On the night of 3-4 May the enemy counterattacked. Amphibious expeditions of about 2,000 men each landed in rear of the American lines on both flanks under air cover, which by bombing airfields sought to neutralize American air forces. The Japanese fired an intense artillery preparation. On the west side, American amphibious tanks went out into the sea to meet the invaders, and a water fight resulted. At dawn an enemy frontal attack led by tanks followed the conclusion of the artillery preparation. A very mixed battle followed in which the American fleet and air force participated as soon as it was light. By end of the 6th, the enemy had been everywhere repulsed, although he had reached the line of command posts in places. As a result of this battle, the 6th Marine Division was inserted in line, giving four divisions for a six-mile front. This battle cost us about 2,000 casualties.

On 8 May a new attack was continued which increased in intensity to the 12th, and ended with the 13th. Weather was generally good throughout this period. The fleet increased its support by firing up to 2,000 tons of ammunition in a day. Large numbers of planes constantly aided the troops. Notwithstanding, the enemy's artillery was deadly and his resistance undiminished. The enemy's fire was so accurate, continuous, and effective that it was impracticable to bring supplies forward on the ground. They were dropped to forward areas by planes. Enemy planes occasionally intervened, and during this battle badly damaged the aircraft-carrier Bunker Hill. The right of the Marine Corps reached the edge of Naha, but the main objective of Shuri was not reached. Casualties for the six-day battle were 4,425, an average of 737 per day. Many tanks had been put out of action.

It was decided to continue the attack on Shuri in the belief that the enemy would lose so many men defending it that his resistance would collapse. For this purpose, tanks formed the nucleus of the attack groups. They shot streams of flaming gasoline against presumed enemy positions, usually caves. The enemy was deeply dug in on reverse slopes. Our guns could not drive him out of caves. When ridge crests were reached, accurate Japanese artillery fire drove the attackers back, vulnerable to counterattacks issuing from reverse-slope caves. This difficult form of warfare was continued against Shuri without cessation. In the next four days to include the 17th, average daily casualties were 435, in limited attacks.

On 20 May, following a strong artillery preparation, a new major attack started. The artillery fired over 10,000 tons of ammunition alone against the main target, which was 400 yards by 600. The tanks failed to get forward and infantry moved ahead without them. The day's gains varied from a quarter of a mile to one mile on the flanks. Flame-throwing tanks were engaged, and used in the succeeding days to burn out cave after cave. On the 22d it commenced to rain daily and heavily, and the ground became so muddy that tanks were unable to do much. On the 23d Naha was entered, and partially cleared by the 24th. On that day the attack was slowed. That same night, Japanese airborne troops landed on American fields. They were in small numbers, and were overcome, but before they had accomplished some damage. American casualties for eleven days ending the 24th averaged 527 a day.

Up to the end of the month, operations were hampered by over thirteen inches of rain within ten days. Trucks, jeeps, weasels, and tractors could not move. Ammunition, food, and supplies had to be carried on foot or dropped from the air. But the fight went right on, and on the 30th Shuri Castle was captured, ending more than a month's effort to advance two miles. The 2d Marine Divi-
tion rejoined, and by alternating divisions, four or five were maintained in line.

June brought good weather. By afternoon of 1 June, armor could maneuver, and the general attack was renewed all along the line which now included Naha and Shuri. Again flame-throwing tanks went forward, followed by infantry and engineer squads to demolish cave entrances as fast as they were burned out. The enemy's forces were by this time reduced, and the end was approaching. Notwithstanding that there was still much mud, troops advanced faster. Forward troops were kept supplied by air, about thirteen and a half tons a day being so delivered for one division for five successive days. By 10 June the advance had arrived before the enemy's last line of resistance, being the edge of a plateau—Yaeju-Dake. This was a five-mile line which had been shelled and bombed for several days.

The final attack started on the 11th. The enemy resisted until the last, never ceasing to struggle, and counterattacking on occasions. The last resistance, except for isolated caves, was on 22 June, when the campaign was considered as closed. Our total losses on land for the entire period were 6,960 killed and 29,598 wounded, a total of 36,588, giving an average of 458 a day. Losses on the sea, due to mines, torpedoes, and all attacks, amounted to 4,907 killed and missing, and 4,824 wounded, a total of 9,731.

COMMENTS

Criticism has been made that the month-long attack on Shuri could have been avoided by landing an amphibious expedition in rear of the enemy's Shuri line. This had been considered. The coast in that area was bordered by reefs. Beaches were limited due to long cliff fronts. Assuming that the available beaches could be captured, a G-4 study showed that supplies for not exceeding one division could thereafter be landed daily. A G-3 study indicated that one division would not have had a fair chance of surviving.

The enemy's cave defense line had not been foreseen, and was not immediately evaluated at its true value. This led to releasing one division, which it was later necessary to bring back.

The effect of artillery preparations and air strikes on cave defenses was materially under what had been expected. It was often nearly useless. It was necessary to attack caves by separate small detachments, series after series. This resulted, during May, in an average advance of only about half a mile a week.

Best results against the caves were from tank flame throwers, assisted by smoke screens and with the support of troops on foot. However good this was, mud sometimes stopped the tanks and it was necessary to get along without them.

Japanese artillery was good. There was much of it and it was unfortunately accurate. It caused considerable losses to personnel and matériel. A part of the artillery fired out of caves, into which guns were withdrawn when not firing. To neutralize this kind of position, direct hits on cave openings were required.

Best cave defenses were those connected by tunnels linking a number of cave openings. To capture these required that all caves of the set be under attack at the same time. It was not always possible to locate a complete set, as caves were camouflaged, and there was no easy way of telling which way the tunnels ran.

Japanese losses exceeded 100,000 men, or well over twice American casualties. A part of this loss was due to the custom of killing their own wounded, or the wounded killing themselves. However, making allowance for this, it seems that American tactics were so far superior to those of the Japanese that notwithstanding a desperate defense it was possible to overcome it with inferior losses.
The Psychological Angle of the Combat Order

Lieutenant Colonel William B. Ross, General Staff Corps
Assistant Chief of Staff, G-3, 3d Infantry Division

When reflecting on the eight successful campaigns which the 3d Infantry Division has undergone during the present war, one is impressed by certain methods of operation which, while based on accepted procedure, have been modified to produce best results. It is proposed here to inspect several of these features with a view to illustrating workable variations from the normal.

Whereas the usual military order is a masterpiece of dry, condensed, abbreviated terminology, a typical 3d Division order tends to be somewhat longer, and written in semi-narrative style. This practice, according to those to whom the order is directed, makes it easier to read and understand. While established procedure calls for normal book-like paragraph composition of mission paragraphs, this division enumerates under the unit being given the mission all separate items of the mission, and gives each of these items a sub-paragraph number. It has been found that this practice eliminates the overlooking of small items which sometimes are camouflaged in a block of print. Furthermore, these missions are presented in the order in which they are most likely to be executed, and tend to paint a picture for the commander receiving the mission of the sequence of his forthcoming action.

Liberal use is made of paragraph "1.b." for the careful identification of all adjacent and supporting elements. The action of adjacent units, ascertained by liaison or from higher headquarters, is described fully, and the changes in supporting elements are recorded with each successive order or Operation Instruction. This practice has aroused considerable interest on the part of subordinate elements as to what engineers and how much corps artillery is backing up the division. Interest in air support has actually been stimulated by frequent references to air missions in this paragraph.

Perhaps the most used, and sometimes abused, paragraph in the order, or Operation Instruction, is "5.c." The 3d Division Commander has adopted this paragraph as his own, and uses it for a variety of more or less personal instruction material. Here are found specific and highly detailed instructions concerning certain phases of the operation. Here, too, can be found references to morale, offensive spirit, and fighting determination. Every attack order contains a "pep talk" by the Commanding General in this paragraph, and although it might appear to some that repetition would detract from effectiveness, the opposite has been true—commanders, and even troops, talk about it, look for it, and respond accordingly.

The overlay has been used extensively either as an order in itself or as an accompaniment to an order. Whereas the earlier overlays were multi-colored masterpieces, later ones were produced entirely in one color by pencil. It was found that this practice saved upwards of one hour in production time, and more than offset any disadvantages attendant upon one color. In fact, in no instance did the division have an occasion to put out an overlay in which one color only was not sufficient.

The division habitually designates phase lines in its zone of advance. Certain commanders dislike the use of the phase line, mainly because it tends to break the action to the ultimate objective into intermediate phases, and causes some subordinates to look ahead not to the final objective but only to the next phase line. This tendency was soon noted, and for one period of time division orders made no reference to phase lines whatsoever. As operations progressed, however, the need for control and coordinating lines became evident, and so-called phase lines were again introduced with very explicit accompanying instructions concerning its interpretation. The line, for example, was to serve as a means of ground orientation and reference, as a coordinating line, as a line
upon which passages could be planned and
effected, as a line of departure for attack
continuations, as a no-fire line, and bomb
safety line. Occasionally, the line could be
given as an objective, or a line beyond which
elements of the command would clear or as-
semble.

During the extremely rapid advance from
the Rhine River to Berchtesgaden, the em-
ployment of phase lines in the division zone
vastly simplified the instructions relative to
maneuver. Two regimental combat teams
(RCT's) were normally employed abreast in
the assault. As could be expected, one RCT
habitually outgained the other—due mainly
to the demolition situation and the status of
isolated pockets of resistance. When such a
gap in depth occurred, the Division Com-
mander normally moved the reserve RCT
forward in the wake of the leading assault
RCT and crossed it into the zone of the
rearmost RCT on a phase line. The former
assault RCT would then be ordered to mop
up its' zone to that phase line, and pass to
reserve at that point.

It should be noted that phase lines were
necessarily very carefully located on the
ground. Prominent roads, railroads, streams,
and ridge lines were used almost exclusively.
In cases where the nature of the terrain was
such that these features were not present,
the line was generally defined by a combina-
tion of prominent hills and streams. The
distance between lines varied according to
the well-defined features on which they could
be based, but as a general rule they were
placed about 10,000 meters apart. This spacing
was also favored by the artillery as an aid
in estimating and conducting displacements.
Rather liberal leeway was permitted in the
naming of phase lines, but at the last, the
names of all of the division's Congressional
Medal of Honor and Distinguished Service
Cross men were used.

Many, critics have commented on the 3d
Division's method of defining objectives
and of governing the action of subordinate
units by the "goose-egg" and arrow method.
Whenever the fighting was slow and severe,
the Division Commander took the liberty of
effecting his own study of the problems of
his regimental commanders, and of pre-
scribing not only the ultimate objective but
most intermediate objectives as well. These
were indicated on an operation overlay by
goose eggs, and the route to any particular
objective was depicted by an arrow leading
thereto. This arrow indicated that the ad-
vance to that particular feature would be
made via a certain ridge, a draw, a woods,
etc. Obviously, this practice resulted in the
operation overlay resembling a polka-dot
dress, and in effect served to prepare the
regiment's own operation overlay. On the
other hand, it stimulated detailed study by
subordinate commanders, and offered them a
solution by an experienced leader. The com-
manders were free to modify the plan of
attack as necessary on the ground.

It is well to note that the many inter-
mediate objectives prescribed by the Divi-
sion Commander were battalion objectives,
and were always based on the terrain. The
axiom that the successful unit fights the
terrain and not the enemy was proved con-
clusively in all of the division's actions. This
rather unique method adopted by the Com-
manding General insured that this principle
was studied and followed.

Since the goose-egg system of outlining
objectives required careful study by the Com-
mander and his staff, this attitude was
thereby transmitted to each succeeding ech-el-
on of command. Conversely to this, on one
occasion, due to operational emergency, an
operation overlay was issued by division
showing the final objective and zones of
action only, omitting intermediate goose
eggs. The operation was conducted like the
order. Commanders apparently ordered "as
skirmishers march." Since no detailed plan
had been prepared by division, the con-
sequences were reflected down through the
lowest echelons. The operation finally was
accomplished, but with much confusion.
The Development of Japanese Army Air Force Pilot Training

LIEUTENANT COLONEL JOHN C. MARCHANT, Air Corps
Instructor, Command and General Staff School

THE EARLY PERIOD

From 1911, when the Japanese Army first sprouted wings, until 1919, officers did not volunteer for flying training, and those detailed for the work generally tried to get out of it. Casualties were always over twenty percent, and for this reason the Japanese Air Service was very unpopular with Japanese officers. To encourage flying, the Government offered a bounty to owners of private machines, and public-spirited citizens offered prizes and subsidies for the encouragement of the flying art.

As of 14 January 1918, it was estimated that the total number of aircraft in Japan did not exceed fifty-nine, and of this total ten were army student type aircraft. The school for aviators was located at Tokorozawa, and the chain of command for flying instruction was as follows (Figure 1):

MINISTER OF WAR

MILITARY SERVICE DIRECTORATE

ENGINEERS SECTION

COMMUNICATIONS BRIGADE

SCHOOL FOR AVIATORS

Figure 1.

Men for flying units were enlisted for three years in the ordinary conscript manner. Separate from and in addition to the units, some twenty officers were detailed each year from the Engineer Corps or Staff and Line branches to the aviation school for six months' training. The most apt of these officers were then given an additional six months' service, and those surviving were returned to their regiments and a new class enrolled.

THE FRENCH MISSION OF 1919

The Japanese Government saw the need for experienced instructors in its training program, and towards the end of 1918 approached Great Britain with a request for a military aviation mission to help in the organization and training of an efficient air force for their Army. The British were unable to accede to this request, and the French offered their services, which were accepted.

On 15 January 1919 a French military mission of eighteen officers and twenty-two noncommissioned officers, headed by Colonel Faure, arrived in Japan. Although originally scheduled to stay for only four months, the mission remained for a much longer period because of the slow progress of the Japanese in learning to fly. It was reported that none of the Japanese had developed into good aviators by the end of the first six months, despite the fact that all of them had had at least two years' previous experience in their own air service. The two main reasons given for the Japanese lack of success in flying were (1) a slow nervous response, and lack of coordination, and (2) an almost entire lack of mechanical ability.

THE ARMY AVIATION SCHOOL

The Official Gazette of 14 April 1919 published many new regulations applying to changes in the Japanese military organization. The most important change related to the Aviation Service, which was removed from the Communications Brigade of the Engineer Corps and placed under a major general as a separate branch in the Military Affairs Bureau of the War Office. Also under these regulations the Army Aviation Directorate and the Army Aviation School were created, thus establishing the following chain
of command for flying instruction (Figure 2):

**MINISTER OF WAR**

**MILITARY AFFAIRS BUREAU**

**AVIATION SECTION**

**ARMY AVIATION DIRECTORATE**

**ARMY AVIATION SCHOOL**

*Figure 2.*

The first Army Aviation School was established in 1920, and by the close of 1922 two more aviation schools had been organized. Regulations of the Army Aviation School provided for the following three classes of students:

A-Class Students.—Selected for the advanced course of study from company officers, warrant officers, and noncommissioned officers who passed the elementary course of aeronautical training—a five-months course.

B-Class Students.—Selected for the study of aerial reconnaissance, observation, photography, and communication, from company officers of each arm—a five-months course.

C-Class Students.—Selected for the study of aerial mechanics, shooting, and bombing, from company officers, warrant officers, noncommissioned officers, and men—a two-months course.

On 1 May 1925 the Army Air Service became an independent arm under the War Ministry but the manner of obtaining personnel for the Air Service had little changed. Men were conscripted as for the other arms and services, and served a period of twenty-two months and twenty days. Company officers and noncommissioned officers of all arms except military police attended the aviation schools, with an average of 120 men in training as pilots each year. Officers, however, were now commissioned in the Air Service instead of the Engineers or some other branch upon completion of the training. The course in pilotage at the Tokorozawa School had been increased to nine months, whereas the course in reconnaissance at the Shimoshizu School remained five months in duration. Pilots were approximately fifty percent commissioned and fifty percent noncommissioned officers.

Following the example set by the Japanese Navy, in 1933 the Japanese Army started the cadet system of training boy airmen, with a view to their becoming pilots and mechanics in the Army Air Service on attaining the necessary age. Plans were also made in 1933 for the training of reserve pilots, ranging from fifteen to eighteen years of age, to increase the Army Air Corps Reserve.

**Creation of the Inspectorate General of Aviation**

The 7th of December 1938 marked another milestone in Japanese Army aviation training. The Inspectorate General of Aviation (*Koku Sokambu*) was established to supervise the training of flying and maintenance personnel. The office ranked with, but after, the other three members of the Army General Staff and its creation removed air training from the control of Air Headquarters.

The Inspectorate General of Aviation consisted of the following departments and responsibilities:

1. General Affairs
   - Organization
   - Supply
   - Finance
   - School

2. Training
   - Airmen
   - Maintenance Personnel

3. Medical
   - Medical Training
   - Aviation, Medical Personnel

Air Signal Communications, Meteorological, and Air Technical Inspector training remained the responsibility of Air Headquarters, under the War Ministry.
During the years leading up to the attack upon Pearl Harbor, some lessons for combat training were learned by the Japanese during the conflicts in Manchuria and China in 1931 and 1937, but the study of the German Air Force made by Yamashita, then Inspector General of Aviation, in 1940-41 undoubtedly formed the basis for much of the modern training program. As of 1 December 1941, training aircraft had reached the total of 1,148, of which 838 were school trainers and 310 specialized combat training type aircraft. While not widespread, some training equipment such as Link Trainers and a bomber trainer, on which bombardiers were trained, was available.

**Organization and Scope of Training**

In 1941, pilot training in the Japanese Army Air Force covered the four phases shown in the diagram above (Figure 3).

The following outline of the scope of this training indicates that the Japanese methods were quite comprehensive:

**Pre-flight.**—1. *Air Training Units (Koku Kyōiku Tai)* consisted of civilians and volunteers who were permitted to transfer from other branches of the Army except military police. The training period for civilians lasted two years, and included basic military training and spiritual and psychological indoctrination. Military personnel transferring from ground units received eight months of training. No flying was taught. At the conclusion of the training period, students were given aptitude tests to determine whether they would enter maintenance schools or flying schools.

2. *Air Preparatory Schools (Showen Hiko Gakko)* enrolled youths between the ages of fourteen and sixteen, who had graduated from elementary grade schools, for two and a half to three years of basic aeronautical education. Here also the spiritual and “glory of serving the Emperor” features were stressed. Although no flying was taught, upon graduation they were classified as potential pilots, radio operators, etc., and entered the Air Service as superior privates.

**Elementary.**—1. *Elementary Air Schools (Hiko Gakkō)* received students from Air Training Units for primary and basic training. Primary training covered a period of six months, during which the student received twenty hours dual and seventy hours solo instruction. Aptitude tests were then given and the students designated as fighter, bomber, or reconnaissance pilots. Washouts, which averaged about seventy percent, had their choice of becoming radio operators, gunners, bombardiers, or navigators. For the successful students, a basic training period of three months followed in which they received an additional thirty hours in advanced trainers. On graduation, pilots received a pilot’s certificate equal to a peacetime pilot’s license requiring a years’ training.

2. *Air Academy (Koku Shikan Gakko)*.

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**Figure 3.**
The development of Japanese Army Air Force pilot training. The Air Academy received officers and potential officers between the ages of sixteen and twenty-eight for the purpose of producing commissioned personnel for the Air Force. The academy consisted of two sections:

a. Students: second lieutenants from other branches of the Army who received one year of flight training.

b. Cadets: graduates of the Air Preparatory Schools who trained for thirty-two months and received commissions in the Air Force upon graduation.

The course at the Air Academy included flight training similar to that received at Elementary Air Schools.

Advanced.—1. Advanced Air Schools (Hiko Gakko). Students proceeded to these specialized schools, located in Japan, from the Air Academy and Elementary Air Schools. The peacetime course was for six months (shortened to four months during war), during which fighter and reconnaissance pilots logged an additional 150 hours and bomber pilots about 200 additional hours in operational types of aircraft.

2. Flying Training Regiments (Kyoiku Hikorrentai) were located overseas and provided advanced training in operational types of aircraft to graduates of the Air Academy and Elementary Air Schools. They served the same purpose as the Advanced Air Schools, fighter and reconnaissance pilots receiving 120 hours and bomber pilots 200 hours training in operational types of aircraft.

Operational.—Before being sent on an operation the pilot received from two to six months' further training within the unit to which he was assigned in a combat or overseas area. Here crews started training as a unit, pilots were instructed in local combat tactics, and the pilot was oriented on his area of operation.

The Present System

Early Japanese successes after 7 December 1941 caused little change in their pilot training system. By 1943, however, the part Allied airpower played in Europe and in the Pacific landing operations encouraged the Japanese to regard air power as the dominating factor in modern war. New conscription laws were passed by the Diet and a large-scale call-up of recruits to the Air Forces was made. A new Air Preparatory School was opened at Otsu, similar to the one in existence at Tokyo, and expansion of the flying training units followed in 1944.

At the beginning of 1944, advanced training was conducted at four or five long-established Flying Training Schools (Hiko Gakko) in Japan (which also had the responsibility of forming new units and reforming old units withdrawn from combat), and by eighteen Flying Training Regiments (Kyoiku Hikorrentai), most of them outside of Japan. Both were responsible for supplying pilot replacements to front-line units, and during their four months of training, pilots received intensive instruction in pilotage, air gunnery, bomb and torpedo dropping, navigation, aircraft maintenance, and crew procedure.

On joining the operational flying regiment, the pilot was not considered fit for immediate combat operations and received from two to six months' further training within the unit. Because of increased Allied air activity in the combat theaters, however, it was found that operational requirements did not permit the Japanese to carry out to the full this operational training of pilots, and many were sent on an operation with little or no combat unit training. Cognizance of this deficiency resulted in the formation in overseas areas during 1944 of Advanced Air Training Units (Rensei Hikotai), equipped with the latest type of aircraft and providing operational training for personnel drawn from front-line units and advanced flying training establishments. Meanwhile the Flying Training Regiments (Kyoiku Hikorrentai) had been increased in number and their name changed to Flying Training Units (Kyoiku Hikotai). Advanced flying training schools in Japan were also reorganized and relieved of the responsibility of supplying front-line units with personnel replacements. The system that
resulted is shown in the diagram below (Figure 4).

Had training plans gone smoothly, the Army Air Force would have been in a position to turn out 20,000 pilots per year. Among the factors which upset the training program, it is believed the following are salient:

1. A shortage of training aircraft.
2. Use of inferior quality training aircraft.
3. Interruptions to the training program due to reorganization.
4. Difficulty of transporting training aircraft to operational training areas.
5. Loss of training areas such as Formosa and the Philippines due to Allied advances, and the consequent interruption of training programs.
6. Shortage of fuel for training purposes.
7. Strategic bombing of Japanese installations.

A further disruption of training programs would have resulted as the scope of Allied operations widened. Bomber and fighter strikes against training establishments in the Empire destroyed much of the remaining trainer aircraft, and repair facilities and fuel stocks rapidly decreased. Although the Japanese Army Air Force had a workable system for pilot training, interference with the training program coupled with the dissipation of partially trained pilots on suicide missions could not but lead to a lower quality of flying opponent for the Allied Air Forces.

Preventive maintenance is a word that is self-explanatory. It means preventing breakdowns before they occur by maintaining your equipment properly at all times. Boiled down—it means taking care of those tires by repairing all cuts, breaks, stone bruises, and blisters. It means lubricating with the proper lubricants at the proper time intervals and in the right places. It means taking care of your clothes and weapons. It means taking care of electrical equipment as well as bulldozers or trucks or radios. It means preventing breakdowns in everything you use, operate, or wear. That is the definition of preventive maintenance.

—Maintenance Division, ASF
Division QM -- In Addition

MAJOR C. B. MONTGOMERY, Quartermaster Corps
Instructor, Command and General Staff School

"SIR, a man in the Signal Company was killed this morning, Captain Jones is on the phone and wants to know what he, as company commander, should do."

"Lieutenant, I'm the Headquarters Commandant, not the Graves Registration Officer. You ought to know that the Quartermaster handles graves registration in addition to his other duties. Tell Jones to call him."

"Colonel, I've found a place that produces five to seven tons of ice per day. The Surgeon could certainly use it even if it is not enough for a general issue. How can we go about getting it?"

"That's fine. Make up a requisition on the Quartermaster; and by the way, you had better include all the details on why it is necessary to buy it locally. The new Division Quartermaster is as fussy as an old woman on these local procurement items. I'll call him about it too."

And so it goes --the division quartermaster takes care of these and a great many other activities in addition to his better-known duties. A great many people think of the quartermaster as being responsible only for supplying the division units with rations and gasoline and, of course, clothing and other items of quartermaster issue equipment. These are his day-in and day-out activities and comprise a very major part of his activities. He is also charged with performing a great many other functions which, at least partially because they are not better known, cause him as many headaches as any other special staff officer.

What kind of an organization does the quartermaster have to carry on the many and often unrelated activities with which he is charged? How does it happen that he is specifically charged with duties that may increase his and his organization's responsibilities tenfold overnight? Let us take a look at his basic organization and see just what he has to work with.

The mission of the division quartermaster is to provide quartermaster special staff service for the infantry division. Under the definitions given in FM 10-5, Quartermaster Operations, it is stated that his prescribed duties and responsibilities are as follows:

1. Advising the commander and staff on quartermaster matters.

2. Determination of requirements; procurement, storage, and distribution of quartermaster equipment and supplies.

3. Operation of a general service pool of labor; salvage service; graves registration service; and quartermaster motor transportation, including first and second echelon motor maintenance.

4. Examination of captured quartermaster equipment.

The division quartermaster is a member of the division special staff and, as such, carries out the normal special staff officer's duties as an adviser to the commander on matters relating to his technical service. He commands all quartermaster troops organic or attached to the division and is responsible for their efficient operation in accordance with the desires of the commander.

The quartermaster's office in division headquarters is divided into three sections --each with its own activities which must be coordinated to provide efficient service to the division.

The administrative section is responsible for the quartermaster journal, for the preparation of reports, for issuing orders to organic or attached quartermaster troops, and for all funds which have been allotted. This last duty includes the preparation of estimates of fund requirements, the allotment of funds for different types of procurement, and all of the fiscal accounting relating to fund activities. There is no procurement officer included in the tables of organization and this duty is usually performed by the transportation officer in addition to his other duties.
The local procurement activities of the division quartermaster may be greatly expanded in a theater of operations. In the zone of the interior practically all procurement is handled by post, camp, or station, or other agencies. In a fully organized theater these functions may also be performed by communications zone or army agencies, but many of our operations, especially in the Pacific, are carried out through independent actions without the support of these agencies. In these cases the division quartermaster will make every effort to locate sources of fresh subsistence available for local purchase. He may have to buy fuel and items of local manufacture, and hire and supervise local labor. Any or all of these activities may have to be performed without additional personnel. The accounting for and clearance of vouchers for payment by the finance officer is an involved and complicated business in many situations—especially when lend-lease and reverse lend-lease enter into the transaction. Many unusual local customs have been encountered, such as the use of two or three different measurements to describe a colloquial term. In one instance a ton of firewood meant forty, fifty-six, or 108 cubic feet respectively in three villages within fifty miles of each other. The natives had always sold wood by the ton and to sell it any other way would probably have necessitated an educational course. In the same area, local bread was obtainable at three different prices and, because of troop locations, it was necessary to buy at all three sources. Native labor had to be paid for in kind, and the two races represented would not eat the same types of foods. These various conditions were met satisfactorily by the quartermaster but it took a lot of explanations to the finance officer that the vouchers were in order for payment.

The second major grouping of the office of the division quartermaster is the supply section, headed by the quartermaster supply officer. This section is responsible for all quartermaster supply performed in the division. This includes the supply services of any attached quartermaster troops. The attachment of additional quartermaster units may extend the activities far beyond the normal functions of the section. Bakery units, salvage and repair services, gasoline supply companies, laundry, or fumigation and bath companies may all be attached to the division and their services must be controlled to the maximum efficiency in accordance with the type operation that the division is currently engaged in. The normal organic strength of quartermaster troops in the division is 193 officers and men, but attachments of additional units may well run the total strength to a thousand or more. You might well say that these troops are self-sufficient to carry out their own particular services—but some agency must provide schedules for the rendition of their services to the division units. The supply section must be prepared to recommend the location of the bivouac areas of the various units so that their services may be used in the most efficient manner; it must select accessible locations for dumps and supply points; and it must provide requisitioning schedules for all units organic or attached to the division. In addition, when units are not attached to provide all of these services, it often is the responsibility of the division quartermaster supply officer to provide the services with only the division quartermaster company's personnel. For this purpose and for the designated responsibility of forming the nucleus of a division labor pool, the quartermaster company has thirty-nine laborers in its table of organization. All too often these thirty-nine men are not sufficient to carry out the division's quartermaster activities. Many commanders of other divisional units can not understand why they can not call on the quartermaster for forty or fifty laborers to help out for a few days. After all, doesn't the division quartermaster operate the division labor pool—in addition? In independent division operations, additional labor must be obtained either by the attachment of additional service companies or from local sources.

The transportation section of the office of the division quartermaster, headed by a cap-
tain, is also charged with specific duties which are subject to great and rapid expansion. If a division transportation pool is established, the transportation section will provide dispatching service for its operation. The section is charged with organizing and controlling all division moves from an administrative point of view. It will assign or dispatch truck transportation for the needs of division units in moving either personnel or supplies, if the trucks are available. You must consider this "if the trucks are available" to understand some of the problems of this office. In many, or you might say most, cases there are not enough trucks to meet all the calls made on the transportation officer at any one time. It is often necessary to prorate the available trucks or to allocate them on a priority system in accordance with the urgency or importance of each call in relation to the activities of the division as a whole. Additional truck companies that are attached to the division normally come under the control of this section and are used in conjunction with the three truck platoons, organic to the division quartermaster company, to make up the division motor pool. When additional truck companies are not attached, a division motor pool may be formed by pooling the trucks organic to the division units and not required for routine administrative functions. This is done only on the decision of the division commander, and without exception any suggestion along this line will meet strong opposition from the commanders of tactical units until the commander's decision has been made. It is easy to understand the reluctance of the infantry or artillery commander to lose absolute control of their vehicles, and besides, the division quartermaster is supposed to furnish them trucks on call. That is one of his duties. There are forty-eight 2½-ton trucks in the quartermaster company with the same number of one-ton trailers with a total one-trip capacity of 168 tons available for general-purpose hauling. You can well understand the limitations of their capacity when you consider that these trucks and trailers are supposed to help the ordnance haul ammunition and the engineers haul building materials, they must carry the division reserve supplies of gasoline and rations, and help move troops on call.

The office of the division quartermaster may be organized in any one of several different ways. Basically, there are four officers and fourteen enlisted men included in the tables of organization for the division quartermaster's office. The officers include a lieutenant colonel, the quartermaster; a major, executive; and two captains, the quartermaster supply officer and the transportation officer. The quartermaster company has a captain and five lieutenants. These company officers are assigned additional duties at the discretion of the quartermaster, contingent on the function that he is charged with performing at the time. If there is no graves registration unit attached to the division, one of the company officers is usually detailed as the division graves registration officer in addition to his other duties. The same is true of salvage, bakery, gasoline supply, laundry, or native labor.

This may seem to be an article bemoaning the fate of the quartermaster. It is not—it is simply an attempt to narrate some of the duties of the division quartermaster and the quartermaster company with a listing of the assigned personnel and equipment with which the division quartermaster activities are performed. It is an attempt to bring out the fact that Table of Organization 10-17 provides the minimum of personnel and equipment as a nucleus of quartermaster officers and enlisted men for the quartermaster functions. The quartermaster must be given additional qualified personnel to carry out extended operations just as the division artillery must be reinforced to provide the necessary fire power required for operations beyond the scope of its assigned weapons.
Morale-Busters via the Superfortress

LIEUTENANT RAY M. STROUPE, Infantry
Staff and Faculty, Command and General Staff School

FROM the gaping bomb-bays of high-flying Superfortresses there began to drop, in the spring of 1945, tons of propaganda leaflets intended to undermine the faith in her military leaders of the people of Japan. By the middle of May more than two and one-half million documents had been showered on such cities as Tokyo, Osaka, and Nagoya, and the daily total showed a steady increase. Their roles as dispensers of pro-Allied literature were assigned the B-29 crews in order to provide aerial assistance to the propaganda program of the Psychological Warfare Branch of CinCPac [Commander in Chief, Pacific] and the Office of War Information. Psychological bombs, each containing thousands of leaflets, were included in the normal bomb loads carried by the big aircraft. Originally, the documents dropped on Japan were of two kinds: the first stressed the increasing intensity of American raids on centers of war industry and warned civilians to avoid industrial areas; the second type was a direct appeal for surrender, stressing the critical nature of Japan’s shipping losses and the betrayal of her troops by her high command.

Later, there was prepared a pamphlet on the subject of unconditional surrender and its connotations for the Japanese. Such a form of surrender, said this document, meant (1) the end of the long and ghastly war which began at the Marco Polo bridge in 1937, (2) the elimination of the military leaders responsible for the genesis and continuation of the conflict, (3) the return of Japanese prisoners of war to their homes and families, and (4) the choice, not of victory or slavery and eventual extermination as the Mikado’s press and radio would have the people believe, but rather the acceptance of defeat before or after Allied amphibious forces followed up the aerial blows with an all-out invasion of the homeland.

Further material dropped included Japanese-printed newspapers giving the true news of the war. Aiding in the preparation of these journals was the ex-publisher of the enemy newspaper on Saipan, who included in his writings the accounts of the decent treatment shown by the Allies to Japanese interned in the Marianas.

There has been no precise method of determining the effect produced by this aerial deluge of propaganda. The Psychological Warfare Branch claims no miracles for its efforts to shorten the war. One positive indication of success was obtained on Okinawa, where leaflets dropped to the civilians appeared to have great value; these people, after an initial diffidence, surrendered in droves. During the campaign in the Ryukyus, some of the Japanese military forces turned themselves in on the basis of dropped newspapers alone. An even more significant point, perhaps, is that the only locality in this island chain where civilian suicides were numerous was in the Kerama group, the one place where no leaflets were dropped.

When we are defending ourselves, any obstacle on our front is of great value. Mountains are occupied only for this reason. For an elevated position seldom has any important influence, often none at all, on the effectiveness of arms. But if we stand on a height, the enemy, in order to approach us, must climb laboriously. He will advance but slowly, become separated, and arrive with his forces exhausted. Given equal bravery and strength, these advantages may be decisive.

—Carl von Clausewitz
In June 1944, in the middle of the monsoon season, five British-Indian divisions, with a large number of corps troops and civilian refugees, were surrounded in the Imphal Plain by Japanese forces operating along the borders of India. For eighty-five days, until ground communications were again restored, this force was fed and supplied by a hastily improvised air-supply organization.

The success of this operation was outstanding, and the successful maintenance of this large force by air introduced a new factor into tactics and strategy; it was quickly realized that, in future campaigns, the necessity for establishing and protecting long ground lines of communications no longer existed.

From this new concept, born of necessity, has developed an air-supply organization which has been the sole means of support for more than sixteen equivalent divisions and thirty squadrons of combat aircraft, operating over a front 560 miles long, during an advance of 760 miles.

Operations in Burma

The map (Figure 1) shows, in general, operations in Burma during the past year. One British-Indian corps has driven down the Arakan coast; one British-Indian army has driven from the Imphal Plain to Rangoon; an American-Chinese corps has driven from Ledo to Lashio, opening the road to China; and a special force was flown into the center of Jap-held Burma, disrupting Jap communications and fighting its way back to join front-line troops—Wingate’s Expedition.

During these operations, the central drive, why this was so. Troops were fighting over very rough terrain covered with thick jungle, and ground communications in North Burma were virtually non-existent. It would have been a physical impossibility to support the operations over ground lines of communications.
It is true that engineer road construction units followed the advancing troops so closely that, upon occasion, they found themselves in the front line; but the roads were never close enough to front-line troops to be used for supplies, and even the construction units were on air supply, since frequent road blocks and difficult stretches of road denied travel to anything but a small number of combat vehicles. The two existing fair-weather roads in North Burma permitted tanks to come up in time for major operations but, at Myitkyina, for example, there was no land line of communications, and 212-ton trucks, power shovels, and 155-mm howitzers were flown in for the siege of the city. So far, tanks have been about the only non-air-portable items in the theater; even six locomotives have been flown into the Mandalay Plain.

ORGANIZATION OF AIR SUPPLY

Two separate air supply organizations were set up to support these operations. One American and Chinese organization supported Northern Combat Area Command's drive to Lashio; one British and American organization supported Fourteenth Army in the central drive and XV Corps along the coast. The organizations are basically the same; but details of operation vary somewhat.

Figure 2 shows graphically the system in use. In the rear areas, RAMO's [Rear Area Maintenance Organizations] receive supplies, store, and package them. Air Transport flies the supplies to forward areas and either drops them by parachute or lands them on forward airstrips. In the forward areas, FAMO's [Forward Area Maintenance Organizations] receive the supplies at the airstrips and hold them for the troops, or the troops themselves receive them at drop fields. Receiving troops distribute them by jeep if there is a road, by mule if there is a trail, or by hand if there is just jungle.

Each step, reasonably enough, involves detailed organization.

RAMO's.—Rear areas receive supplies automatically, from SOS in the American case and from Allied Land Forces in the British case. Responsibility of the Rear Area Maintenance Organizations (RAMO's)—that is British terminology; the U.S. calls them Air Cargo Resupply Organizations) begins when truck convoys or trains arrive at the RAMO Station. RAMO's manhandle supplies into storage areas, and turn the required percentage of them over to packers to be prepared for air dropping.

RAMO's are responsible for moving the supplies from storage areas to the individual aircraft, and for loading the individual aircraft under the supervision of the air crew chief. Their responsibility ends when the air crew chief expresses satisfaction as to the loading, unless the supplies are being air dropped; in that case, members of the RAMO accompany the aircraft on its airdropping mission and are responsible for ejecting the supplies from the airplane when over the drop field.

Except for special Ordnance items held by only two RAMO's, each RAMO maintains three or four days of completely balanced stocks and, for special maneuvers, packs and holds for shipment certain items which may be required quickly. Each RAMO is assigned to support specific units, and receives a forecast of operations to enable it to estimate future demands.

Occasionally the airfield at one of the RAMO's may be closed down by bad weather. In this case, another RAMO provides the required supplies to the units normally supported by the nonoperating RAMO. If necessary, additional supplies and aircraft are sent in to the RAMO temporarily performing double duty. Similarly, if one RAMO runs short of specific items of supply, aircraft operating from a different RAMO can supply the requisitioning troops.

Troops requisition through corps headquarters directly to the central office, which then directs traffic to and from the RAMO's as required. In the case of the British-American organizations, requisitions are normally estimated and submitted one week in advance but supplementary requisitions can be filled within twenty-four hours. In the case of the Chinese-American organiza-
tion, requisitions are turned in seventy-two hours in advance, but emergency orders are filled much more quickly; on one occasion, in an all-American organization, aircraft were actually dropping to a unit two hours and thirty-six minutes after the dispatch of the receiving unit's requisitioning signal.

**Air Transport.**—The Air Corps provides the troops, the troops will suffer; during the monsoon period, for example, only one period of three consecutive days occurred when aircraft did not provide normal air supply.

Until the Jap Air Force in Burma was destroyed, transport pilots often played tag with Zeros, sometimes circling for hours under cloud cover, waiting for enemy air-

![Diagram of air supply system](image)

**Figure 2.—Air Supply—Graphical Representation.**

the transport aircraft, air crews, and air maintenance establishments for the forward movement of the supplies. Aircraft maintenance is as for normal flight operations, though flying conditions in Burma are considerably less pleasant than elsewhere, and maintenance commitments are somewhat higher.

Aircraft are loaded with supplies earmarked for a specific unit, and pilots are briefed by an air liaison officer (Army) to land or drop their loads at specific fields or drop areas. Pilots have exhibited a marked ability to fly in outrageous weather, adopting the attitude that, if supplies do not get to craft to leave the area so that supplies could be dropped; aircraft casualties due to enemy action were numerous, but air supply continued with fighter cover and with an aircraft warning net when required. For example, during the strike southward by Merrill's Marauders, an air-ground communication system was established to give warning of approaching Jap fighters; ground spotters with communications to the unit receiving supplies were posted some distance from the drop field, and radio communication was established, by the receiving unit, with the transport aircraft and the patrolling fighter cover. On one occasion, spotters reported two
Jap Zeros approaching the drop field; radio communication warned the transports, who rose into cloud cover, and called in patrolling fighters; our fighters drove away and destroyed the two Jap Zeros; and the transports returned to their air-dropping runs—all within a period of ten minutes.

The most efficient operating radius for transport aircraft is 250 miles. At that radius, one aircraft can make two or three sorties per day, depending on variable conditions, and, consequently, the number of aircraft required to maintain an infantry division is surprisingly low. C-47's are primarily used, but, in emergency situations, B-25's, B-24's, and anything with a pair of wings can be used.

From the air point of view, air-landing supplies is more efficient than air-dropping supplies; due to the limited area of dropping fields in jungle-covered terrain, an aircraft on an air-dropping mission can drop only about four packages per run over the dropping field, and so must circle for about half an hour before completing the mission. Pilots dislike this because of the low, slow fly-in, and the fact that, while dropping, they are excellent targets for enemy fighters. From the ground point of view, though, air-dropping is the answer to a prayer—the supplies are delivered to the company’s back yard and the distribution problem is considerably reduced.

However, in order to save airplanes and parachutes, both frequently in short supply, forward troops construct airstrips whenever possible. If feasible, several parallel fair-weather strips are constructed in one area to speed up traffic and maintain it in case one strip becomes nonoperational. Contrary to accepted engineer opinion, infantry troops with local labor can become very efficient in the rapid construction of airstrips. It has been found that aircraft need only a smooth piece of ground to land and take off, and paddy fields have often been converted to airstrips by manual labor alone in two days or less.

FAMO's.—At forward airstrips, Forward Area Maintenance Organizations (FAMO's—British again) are established to receive the supplies brought in by air. They are responsible for unloading the airplanes, sorting and storing supplies in the vicinity of the airstrip. Requisitioning units then receive their supplies at these dumps—in effect, railhead distribution.

To receive supplies which are air-dropped, each unit maintains its own drop-field team. These teams mark the chosen drop field with panels, clear the drop field after each run, and store supplies at the unit supply dump. Distribution then becomes the problem of the receiving unit.

AIR-DROPPING—A SPECIALTY

Depending on the operational situation, twenty to forty percent of all air supply must be air-dropped instead of air-landed. This system involves some special problems.

Packing.—In the first place, air-dropped supplies must be specially packed; this is done at the RAMO's by a packing section. Supplies dropped by parachute are packed inside special containers to which parachutes are then attached; this involves folding and packing of parachutes, also done by the packing section. It has been found that the para-
AIR SUPPLY

chutes which have been developed for supply dropping will carry heavy loads, but the development of special containers has not kept up with parachute development; users complain that, although the parachute will carry the loads, the containers will not, and supplies frequently break out of the containers. Some supplies can be free-dropped, and a variety of special containers have been developed for this method. Generally, burlap bags and coir matting are used. Loss by breakage is not unreasonably high.

Communications.—It is difficult to find supplies in jungle terrain, and air-ground communication is sometimes necessary and always convenient. Pilots are briefed to reach drop areas by map references, and generally pick up drop fields by panel markings and code signs. If necessary, ground personnel make radio contact on a prearranged frequency when the aircraft is in the vicinity of the troops, and guide the aircraft to the marked drop field, using landmarks or flares. Special communication equipment is also available, which will automatically guide the aircraft to the drop field. Though convenient, it is not necessary to organize a radio section in the drop-field receiving team; the unit's regular communication section can handle the radio traffic. Units on the move through jungle terrain report the map reference of drop fields in requisitioning telegrams, and this information is passed on to the briefing section at the airfields. Officers with Chinese formations on the eastern thrust into Burma report that it was seldom necessary to use air-ground radio communication to lead aircraft into the drop fields.

Dropping.—Drop fields are marked to show the direction of run by the airplanes, and the drop is made from such a height that there is no forward motion when packages strike the ground. Normally, this is so low that the wind will not seriously affect parachuted supplies. Unfortunately, drop fields are sometimes necessarily located close to troop concentration areas, and casualties have been caused by aircraft flying across the drop field in the wrong direction and free-dropping into the troop areas.

Supplies are pushed out of the airplanes generally in lots of four packages, but equipment is now being developed to assist this manual process, and future dropping should be more accurate and perhaps faster.

A technique for dropping at night was developed to support Wingate's Expedition. Drop fields were marked by directional lights, and aircraft were briefed to approach from a specific direction. The system worked satisfactorily, and the required support was maintained. However, it was hard for drop

A three-day ration pack for one man.

The A-4 container with a 21-foot chute. Used for ration packs.
teams to hit the drop field each time, and virtually impossible for receiving teams to find packages which had fallen in the jungle; this system therefore proved expensive in lost equipment, and it was abandoned as soon as operationally possible. It is emphasized, however, that the system did work, and logistic support was provided.

In addition to providing the best possible method of supply from the ground troops' point of view, air-dropping is popular with them because of the wide variety of by-products produced. Unsalvageable parachutes are used for towels, handkerchiefs, bandages, clothing, marking panels, living-quarters, and barter with the natives. Rope and cord are always valuable in the jungle, and the packing cushions used in parachute containers provide the only comfortable seats and beds you will ever find. Colored chutes are at special premium—beautiful silk shirts and shorts. Parachutes are salvaged whenever possible, but units maneuvering in jungle terrain normally have no way of returning them—light aircraft being used to capacity for casualty evacuation.

Ground troops in jungle terrain generally agree that except for special equipment, the 18-foot British cotton parachute is superior to the U.S. 22- and 24-foot rayon chutes for supply-dropping purposes, but by reason of convenience only. A 24-foot chute carries about 350 to 400 pounds. This load, when received by ground troops working in jungle, must then be broken down to mulepack loads. On the other hand, an 18-foot chute carries only 100 to 105 pounds, and three such packages can be slung on an American mule to constitute a normal, properly balanced load without further breakdown. When supplies are dropped in bulk to units in open country, with motor transportation, this complaint naturally does not apply.

During an emergency period at the beginning of operations, parachutes were made from burlap—"parajutes"—and were used to supplement a very short parachute supply; they were inefficient, but nevertheless worked satisfactorily enough to carry the theater over a very difficult period.

**The Retail System**

The organizations explained above handle supplies in bulk, on a wholesale basis. The requisite number of cases of rations or ammunition is forwarded, and using troops receive them in bulk and break them down for use by smaller units.

In the case of Merrill’s Marauders, and the Mars Task Force, however, the special nature of operations required not only speed but also the organization of supply on a retail basis: supplies were forwarded already broken down for issue to the individual soldier. From the point of view of the receiving troops in the battle area, this is obviously the approved solution.

The detailed organization providing this approved solution was a bit more refined and, we thought, more efficient than the other type of organization.

Fighting troops requisitioned directly on the rear supply area supporting them instead of through the G-4, and, after sufficient radio equipment became available, the G-4 monitored the incoming signals. This saved considerable time in the transmission of requirements to the base area.

As in the other organizations, SOS delivered supplies to the supply base warehouses, and these supplies were then packed, stored, and loaded into aircraft by the base personnel. However, internal organization was designed for high speed and supplies were broken down at the base area for delivery to the individual soldier without further work being required of units in the field.

Individual rations for two, three, and five days were packed in separate bags, and fifteen days’ supply of each type package was maintained. Ammunition was packed in units of fire, and also in bulk, and fifteen days’ supply of each was maintained, packaged and ready for shipment. Other types of supplies were similarly packaged.

Enlisted men holding the keys of warehouses were billeted in the warehouse area,
truck drivers were billeted in the motor pool area, and packers and loaders were billeted near the warehouses. Loud-speaklers were set up in warehouses, barracks, the motor pool, and recreation centers. When signals requiring immediate action were received, the loud-speaker system notified all personnel at once; trucks generally reached the warehouse area within five or ten minutes, and by that time warehouses had been opened and loading crews were ready and had received instructions as to what should be loaded. While trucks were being loaded, air crews were alerted, pilots briefed, and the airplanes prepared for flight. This was the system that provided supplies in two hours and thirty-six minutes after the origin of the requisitioning signal—from a base 250 miles away.

In addition to the element of speed in forwarding supplies, this system obviously saves a tremendous amount of work for supply personnel in the field. Rations can be dropped, stacked alongside the drop field, and issued directly to the soldier without further breakdown. If the operation is such that a hot meal can be provided by mess personnel, the same rations can be turned over to company kitchens. Ammunition can be dropped in packages suitable for mule transport without further breakdown; it can be dropped in packages ready for issue to gun crews, or in clips ready for issue to the individual rifleman, depending upon the situation. In other words, supplies from the rear area can be provided exactly as the soldier on the front line wants them.

**Future Possibilities**

Air supply is still young. New techniques are being developed; details of operation are being improved. As an established system, it is about one year old now, and we are nowhere near the top yet. However, there are disadvantages to its use, and enthusiasm for its services must be tempered with a consideration of its difficulties.

In the first place, at least local air superiority is required in order to protect the supply carriers during their trips into forward areas. Forward airstrips should be constructed—for the most efficient use of equipment; to avoid a large supply of parachutes; and to avoid loss of supplies due to inaccurate air drops. In countries subject to heavy prolonged rains, airstrips should be all-weather, which involves a heavy engineer commitment. Use of airplanes involves high gasoline consumption, and calls for specialized maintenance crews and equipment.

But, in spite of these difficulties, air supply remains the tactical solution to logistic support. It is the only sure means of supporting a fast-moving situation in any kind of terrain. It is the only possible means of supporting an extensive campaign in the heart of a jungle-covered country. It overcomes the obstacles of impassable roads, unbridged rivers, enemy-held terrain, swamp, jungle, and mountains. It makes unnecessary the maintenance and protection of long lines of communications. It makes possible tactical and strategic maneuvers, heretofore discarded with a wistful sigh because the G-4 could not support the maneuvering troops. It is the fastest possible method of delivering large quantities of supplies over long distances.

Giders have not been used for normal maintenance in this theater, being saved instead for special operations, but gliders are an important corollary to air supply and were apparently used extensively in the European Theater of Operations. As aircraft and gliders become larger and more powerful, it will be possible to transport practically any piece of ground equipment yet made.

Also, as aircraft become larger and more efficient, it will become possible to transport more and more men and supplies per sortie. And when some cunning little scientist develops an airplane that can carry a battalion complete with equipment, that is capable of landing on a 200-foot runway, then supply problems will become a matter of organization only, and warfare will really become mobile.
G-3 Studies the Attack of a Fortified Position

MAJOR DONALD W. FOUSE, Infantry
Instructor, Command and General Staff School

Although techniques which are used in modern warfare have been modified by the introduction of new weapons, the methods and principles as used, applied, and proven to be worthy centuries ago, still apply. In days gone by, the attack, to be successful, had to be able to penetrate the castle wall, the blockhouse perimeter, or the fort defenses. To effect this penetration it was necessary for the attacker to attack with powerful mass and with surprise. Today, the same principles apply. We must concentrate sufficient mass without detection on a narrow front and strike with maximum surprise. It is with this proposition that the following ideas are developed with particular attention to the problems confronting an infantry division G-3 in his planning for an attack on a fortified position. It will be noticed that this general staff officer must work closely with all other staff and command agencies in this planning.

By a fortified position is meant an area defended in depth by means of log, concrete, steel, and cave or underground defensive works. "The defensive works usually consist of fortified weapon emplacements, or bunkers, and protected shelters, together with entrenchments and obstacles" (FM 31-50). It is contrary to sound doctrine to attack such a formidable obstacle, but occasionally the situation in the field is such that in order to continue our advance an attack of a fortified area must be executed.

In planning this type of operation the division G-3 is confronted with many problems. He must know as early as possible from G-2 information just what type of obstacles the division is likely to encounter. Probably his first obligation is to be sure that he has set up the proper training program for the division for this type of attack and that it has been or will be accomplished. With this information in mind he can recommend a comprehensive training program which will embody all the essential elements necessary for efficient execution of the forthcoming operation. As early as possible he should know what units will be supporting the division and, if possible, arrange to have these units train with the division. For, in this type of operation, extremely close coordination is paramount, if success is to be achieved economically. Each unit attached to the division should work as closely as possible with the element it is supporting. All organizations should enter the assault working with clock-like precision—not in a stereotyped manner but so that the inevitable battlefield surprises can be dealt with immediately without an interruption in the basic plan of assault. Units to be attached to the division might well include tank destroyers; medium tanks equipped with 90-mm guns for direct fire support; other medium tanks equipped to operate flame throwers and dozer blades; antiaircraft automatic weapons units, preferably self-propelled for close support; a chemical mortar unit; a 155-mm self-propelled field artillery unit; and an attack dog unit. Most of these organizations once attached to the division from higher command echelons can be assigned by division, or down to the infantry regiments under whom or through whom they will be controlled at the center of action. If such an allotment of power is made to the infantry regiment, the need for closely coordinated training programs and their supervision by G-3 is apparent. By the same token it is essential that the infantry regiments themselves, as well as the attachments, be given ample opportunity to gain complete knowledge of the capabilities and limitations of each arm. All of this presupposes that sufficient time is available for comprehensive training to be put into effect.

Assault detachments must be organized to include wire-cutting, flame-thrower, grenade-launching, rocket-launching, and demolition teams ranging from squad to platoon strength. At the same time, part of the regiments or of the battalions must be retained at their organic strength and com-
position to be employed (1) against targets not suitable for assault teams, (2) to occupy captured areas, and (3) to repel counterattack. Within the assault detachments, each man must know how to perform each job in the team so that casualties in a particular unit will not delay the advance for the lack of properly trained personnel. This is especially true with regard to the flame thrower. As indicated above, all of this training must be integrated by G-3.

He also will be concerned with furnishing this specialized equipment during training as well as in the forthcoming attack. Therefore, he will establish close liaison with G-4 on supply matters.

Once the attack plans are announced, G-3 will work with G-4 in determining the concentration areas of ammunition and service installations in the forward area, in accordance with the plan for attack, so that a feasible plan for concentrating the troops in the forward area can be accomplished. Once the reinforced infantry division is ordered to move to its forward bivouac area, the bulk of the Class V supplies should be in position and the service areas selected. G-2’s counterintelligence plan must also be carefully coordinated with G-3’s plans for the troop and supply concentration phase and the attack phase of the operation.

G-3 will also maintain close liaison with G-2 for securing late information concerning developments of the enemy situation at the sector of the attack, once the zone of action has been decided by higher authority. Based on this information, G-3 can work out his plans for attack with the assaulting regimental commanders.

G-1 will furnish G-3 with the expected replacement program, since casualties can be expected to be above average in this type of operation. Between them, these two general staff officers will decide the plans for removal of civilians from the areas secured, since evacuation, freezing, or curfew restrictions on civilians will be directly affected by the scheme of maneuver as proposed by G-3. The surgeon’s medical plan must be introduced here to facilitate the treatment and evacuation of the wounded.

The division engineer will work closely with G-3 to develop the plan for the employment of the division engineer combat battalion in the attack. One logical and workable role for this unit is to have it work well forward with the infantry assault units to clear major obstacles, seal or destroy fortifications which have been reduced, and assist the advance of the supporting direct-fire heavy weapons. Since the organic division engineers will be employed forward in the assault zone, plans will have to include provision for additional engineers to support the action within the division area to the rear of the assault zone.

In planning the actual attack, the G-3 will make a thorough study of the area to be breached. Since the division frontage normally will be reduced greatly and the enemy defenses greatly intensified in the attack of a fortified area, more detailed analysis of the situation is necessary than is customary in an attack of an area hastily fortified. To insure that no detail is overlooked, G-3 might attack his problem in the following manner: He should isolate the fortified area limited on the flanks by the division boundaries and forward and rear by the known depth of the position. The area then might be subdivided further by establishing the boundaries between attacking regiments on the axis of advance. Then, working from the foremost line of the enemy battle position within the division zone, the area can be subdivided in depth by the establishment of successive cross-bands or phase areas. So, when the subdivision of the area is complete, he has, in essence, divided the enemy area within the division zone of action into a checkerboard, in each block of which there is an equitable distribution of the enemy’s fortifications, in so far as possible. With this preliminary planning complete, the G-3 then seeks the recommendations of the individual regimental commanders as to the manner in which each desires to attack the fortifications within...
his regimental sector. When these recommendations are complete, the G-3 will consolidate them into a master assault plan for the entire division. The plan of one division should be coordinated with the plans of the adjacent divisions to insure progressive results over the front to be penetrated.

The assault plan should include phases in which each known fortification is to be assaulted. While some of the positions are being assaulted during one phase, installations that are to be assaulted in succeeding phases can best be neutralized by smoke or fire from direct-fire weapons to facilitate the reduction of fortifications under infantry assault. These large-caliber, high-velocity weapons also will be supporting our assault teams, so the individual fortification upon which each direct-fire gun is directing its attention should be named in the master plan. It is believed the time of attack and the time of advance from one phase to the next should be under division control to insure a smooth, methodical advance which will prevent any one unit from being isolated in the event it advances beyond supporting distance of its adjacent units. The assault plan will be as complete as possible, leaving little to the imagination, so that when the positions as yet uncovered by G-2 are developed they can be reduced in order, without a major interruption in the coordinated plan. It must be remembered that in the bulk of his planning, G-3 based his plans on the recommendations of the infantry regimental commanders whose units actually are going to reduce the position in question.

Now let us consider a few other agencies with which G-3 must consult as he works through this planning phase.

Any smoke that is to be used in such a concentrated attack should be employed on the recommendation of the division chemical officer. Wind conditions change so frequently that smoke laid indiscriminately may produce the desired results in one sector and may blind the advance in another. Furthermore, the smoke and dust which will result from concentrated artillery preparations will have great blinding effect on the occupants of the fortifications. In any event, G-3 should receive possible plans for smoke employment, if it be decided that smoke can be used profitably. The smoke plan should include a detailed schedule for each of the assaulting units and should be incorporated directly with the assault plan. To be successful, smoke must be available on call, which means that the signal system within the sector of the advance, particularly wire and radio, must meet this requirement. Since smoke can be employed by high trajectory weapons, the smoke plan probably will form a part of the infantry plan for the attack. Communications can be directed, therefore, through the infantry circuits. So here we see the need for integration between the signal, chemical, and division artillery officers and the G-3. In all cases, the latter will be the final coordinating agency.

G-3 will confer with the air-ground liaison officers (AGLO) to formulate plans for the use of air power before and during the attack. Prior to the attack and during the operation, the air arm will furnish its primary support in securing air superiority. If surprise, security, and safety to our own troops will permit, air can render great help to the immediate front prior to the attack by dropping fire bombs, which will reduce camouflage at the fortifications and thereby expose the enemy's defensive positions. Some enemy personnel casualties may result, but disclosure of positions will be the most advantageous result: The information thus obtained will greatly aid G-3 in preparing his plans for the attack. Once the attack is under way, air power can be used most advantageously to isolate the battle area to prevent reinforcements being moved into the sector under attack. Close-in support of infantry by air during an attack of this type is an unprofitable procedure. Attacks on such positions are primarily a ground force job. Therefore, air can be used better, as indicated. G-3 also can call upon AGLO for strikes to be made on successive fortified targets outside artillery range, as the field
G-3 Studies the Attack of a Fortified Position

He likewise must give thought to his plans for sudden delays due to strong enemy counterattack, and the means available in the overall plan of attack to repel the enemy's bid to disrupt our penetration of his fortified area.

Despite the complexities which face G-3 in planning an attack of a fortified position, mass applied in force with surprise is the governing factor in all his preparations to set the attack in motion. Throughout all of his planning, extreme care must be exercised to see that all possible eventualities have been considered. If his plans are loose and carelessly done, he can be sure that a good portion of the casualty list can be accredited to him for his incomplete work.

Responsibility for Mental Health

Digested at the Command and General Staff School from an article in The Bulletin of the U.S. Army Medical Department July 1945.

The majority of the factors which determine the mental health of military personnel are functions of command. It is a responsibility of command to obtain maximum utilization of manpower by providing proper incentive and motivation, and such reclassification, reassignment, rest, relaxation, and recreation as exigencies of the military service permit.

The psychiatrist acts as adviser to the command. It is his responsibility to be alert to the situational factors which are precipitating psychiatric disorder and to recommend the measures necessary to alleviate or remove these factors. He should survey the training program from a psychiatric viewpoint, advise concerning schedules, the method of conditioning troops to battle situations, and adjustment to extremes in climate. He should pay close attention to such matters as the furlough policy and the handling of AWOL cases. Through collaboration with the personnel classification officer he should be able to prevent many psychiatric disorders by bringing a medical viewpoint to bear in the job assignment problems. He should be alert to evidence that troops are approaching the limit of their endurance and are in need of rest. He should be equally alert to untoward effect of boredom from excessive idleness. He should advise other agencies which are important to the morale and mental health of the troops: the information and education officer, the chaplain, the Red Cross, and the special services officer.
Voluntary Study in the New Army

COLONEL FRANK J. SACKTON, General Staff Corps
Assistant Chief of Staff, G-3, 33d Infantry Division

This article was written while the 33d Division was still in combat in the Philippines.—THE EDITOR.

THE Army's Information and Education Program is looming on the horizon with greater importance. Our soldiers have a thirst for knowledge and education, and with the conclusion of a campaign they look to their leaders for something constructive with which to occupy their spare time.

"An idle mind makes a bored person." In order to prevent boredom through enforced idleness during those periods when units are in rest camps, the 33d Infantry Division I & E (Information and Education) Section has prepared a program that is both interesting and educational. More important,

**Spare-Time Study Enrollment Results**

- a. % of completion of canvass in unit.
- b. Number of men desiring courses.
- c. % of enrollments to number canvassed.

<table>
<thead>
<tr>
<th>Unit</th>
<th>a.</th>
<th>b.</th>
<th>c.</th>
</tr>
</thead>
<tbody>
<tr>
<td>123d Infantry</td>
<td>62%</td>
<td>2,405</td>
<td>100%</td>
</tr>
<tr>
<td>130th Infantry</td>
<td>80%</td>
<td>1,896</td>
<td>80%</td>
</tr>
<tr>
<td>136th Infantry</td>
<td>66%</td>
<td>1,910</td>
<td>100%</td>
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<td>48%</td>
<td>710</td>
<td>63%</td>
</tr>
<tr>
<td>TOTAL DIVISION</td>
<td>62%</td>
<td>8,174</td>
<td>85%</td>
</tr>
</tbody>
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Chart A.

Chart C.—Method of study desired.

**Chart B.—Type of instruction desired.**

it has captured the imagination of the soldiers.

Individual study through Armed Forces Institute Self-Teaching Courses, through Armed Forces Institute Correspondence Courses, through University Extension Correspondence Courses, and group study in classes, are available to those interested. The division I & E Officer with the I & E officer of each infantry regiment and separate unit has utilized the period that the division has been in combat in the Luzon campaign to set up programs, enroll students for later study, procure texts, select teachers, and plan the administration and physical facilities for the classes. The results of this prior planning are astounding.

A canvass of sixty-two percent of the division personnel resulted in 8,174 enrollments for some form of study during the rest
and rehabilitation period. On the basis, we can expect that well over 10,000 soldiers in the 33d Division alone will be engaged in spare-time study during the rehabilitation period coming up soon.

These soldiers who desire and seek the opportunity to prepare themselves for a better future present a critical responsibility to the field commanders; a responsibility that cannot be accepted lightly because it deals with the prospects and welfare of American citizens and civilians-to-be. A voluntary study program of such magnitude in a single division presents unparalleled problems. At the same time it presents to the Army an opportunity to render a genuine service to the soldier who has given so much to his country. If patriotism can pay off in education and better civilian prospects to the soldier, then we are taking a sure step forward in starting the “conversion” of the soldier now.

Chart A shows the desire of the soldiers to participate in spare-time study.

Chart B indicates the type of instruction desired.

Chart D.—Enrollment by Subject.

Chart C indicates the method of instruction desired.

Chart D indicates enrollments by subject. All charts are based on 8,174 enrollments which is 64.41 percent of the total strength of the 33d Infantry Division.

The poster is a sample of those used to present the I & E Program to the command.

The Battle of Waterloo, one of the decisive battles of the world, was lost and won for the exchange of thirty-seven tons of cannon balls. In the time it took to win Waterloo on thirty-seven tons, the combined British and American bomber forces can now drop 4,500 tons. The South African War absorbed 2,800 tons—less than one night’s bomb load today.

—From Britain, British Information Services.
Antiaircraft Operations in the China-Burma-India Theater

Digested at the Command and General Staff School from an article by Lieutenant Colonel George A. Meigs, Coast Artillery Corps.

The author was Antiaircraft Officer and Ground Defense Coordinator in the upper Assam Valley during operations from the fall of 1942 until June 1944, and later was commanding officer of an airborne machine-gun battalion during operations in Burma. He returned to this country in October of last year, and this article is drawn from his personal experience and from operation reports.

THE EDITOR.

The Japs had three excellent reasons for fighting in Burma: the country is a rich source of loot; it makes a good staging area for invasion of India; and as long as they controlled Burma they could keep us from using the only practical supply route to China. Allied activity in the theater has centered around one tremendous project—to get supplies to China, whether by air or road.

The result has been a strange and intermittent war, shaped by weather and terrain. In a few areas of Assam and Burma, there are 600 inches of rain a year. In the Naga Hills, 250 inches is common. In most of the operational areas, 125 inches fell, except in the Myitkyina area where eighty inches was the rule. Farther south, however, a 600-inch area occurs again in the mountains around Tiddim.

During the monsoon season railroads are washed out, roads disappear, shoes sprout long, green whiskers, and tents rot overhead to let cascades of water through. The winters, on the other hand, are relatively dry, chill, and dusty, with a northwest wind that whoops down off the Himalayas. The eternal prickly heat and malarial fevers give way to goose pimples and head colds. Instead of oceans of mud, vehicles grind through chuck holes feet deep in dust, and a convoy is visible for miles in the dust clouds it raises. But when the country dries out and the everlasting battle of road blocks and broken bridges and air raids flares up again—each side trying to capture or wreck the communication lines of the other—then life becomes more interesting.

Recently North Burma has been cleared of the Japs, and the Ledo Road has been pushed through to a junction with the old Burma Road. It has taken three long and arduous years to accomplish this, for the initial successes were all Japanese. In these operations American antiaircraft units have played a considerable part.

THE ASSAM PHASE

April of 1942 had seen the famous fighting retreat of the Allies into Assam and India. It was realized that if the Allies were to continue furnishing any of the sinews of war to China, it would have to be by air. A construction program to provide transport airfields and fighter strips was inaugurated in the upper Assam Valley, and these installations required antiaircraft protection.

British forces in India originally had agreed to provide antiaircraft and ground defenses for all airfields in India, wherever they were threatened. However, there was a definite need for antiaircraft machine guns, and it proved desirable to bring in our own antiaircraft to provide further protection for U.S. installations.

In the summer of 1942, five airborne machine-gun batteries arrived in India, and two of them were sent on to Assam to bolster defenses of the two airfields then in operation. Jap air activity up to the middle of September had been held to North Burma. At about that time, the first reconnaissance flights came over Assam, and intelligence warned of possible attacks on the two operational airfields. The other three machine-gun batteries were ordered up by air; however, they were not yet in position when the first attacks came on 24, 25, and 27 October.
By spring, many fighter strips and ATC [Air Transport Command] bases were operating in the upper Assam Valley, and all had antiaircraft protection, some of it entirely British.

The American units underwent continual training. One officer per battery attended the British jungle warfare schools where British officers who had had experience with General Wingate in Burma gave lectures. Upper Assam made a good training ground. While not so wild as North Burma, it is a remote part of the world. Living conditions were not much better than those encountered later in Burma. Since tents rotted away in a matter of weeks and the ones obtained from the British lasted hardly any longer though three times as heavy, bedouhs were soon resorted to. These were affairs made of bamboo, put together with reed lashings and thatched with buffalo grass. Inside they were lined with hessian cloth (burlap), and this kept out many of the insects. However, it was necessary to sleep under mosquito netting.
the year round. Assam and Burma are among the worst malarial regions in the world.

The temperature ranges from thirty-one degrees in winter to 125 degrees in summer, with the humidity high at all times. Prickly heat is a curse, some cases becoming infected and requiring hospitalization or turning into impetigo. The natives know nothing of sanitation and seem to care less; thus all drinking water is chlorinated, whether pronounced good or not, and frequently boiled as well.

**The North Burma Phase**

As 1944 approached, the Allies knew the Japs would almost certainly attempt to invade India. The Japs started their drive as expected, up the Chindwin Valley to cut the railroad to Ledo at Dimapur. They bypassed Imphal and got up to the Kohima area before the British Fourteenth Army sent them staggering back into Burma with fifty thousand dead and four divisions smashed or badly mauled.

In the north, meanwhile, with General Stilwell personally forcing the offensive, the Chinese and Merrill's Marauders were walking down the Ledo Road ahead of the engineers. The Ledo Road kept pace with the advance toward the planned junctions with the Burma Road, and in the wake of the road-building battalions came the airfield construction crews. It is in this operation that American antiaircraft took part.

In general, the antiaircraft mission was the protection of Army Air Force airstrips and vital points along the Ledo Road, principally the fighter strips. Often Jap ground troops were encountered just beyond the perimeter of an antiaircraft defense, and there were numerous brushes with snipers and patrols. Units from rear installations in Assam were leapfrogged to advanced airfields in Burma as they were needed, weapons and men usually being transported by air, vehicles and heavy equipment following down the Ledo Road. As typical an action as any occurred in the capture of Myitkyina airfield in May 1944. Allied headquarters announced the capture of the airfield at 1500 hours. In accordance with prearranged plans the movement of airborne engineers and antiaircraft troops was begun immediately, and by 0100 hours all guns were emplaced and ready for action.

Very early in the morning, the enemy broke through the perimeter defense and attacked the field. In the ensuing fight, one gun was damaged and put out of commission with five thousand dead and four divisions smashed or badly mauled.

Three enemy fighters launched a dive-bombing and strafing attack in the afternoon. A fourth stayed high for top cover. They were greeted with a heavy concentration of caliber .50 fire. Two of the attacking planes were shot down, and the third was smoking heavily as it left. Subsequently, the Japs were considerably more circumspect in their air attacks on Myitkyina. As additional strips went into operation, more antiaircraft came in, and the heavy and accurate fire finally forced the Japs to deliver most of their attacks at night, the favorite hours being pre-dawn. These attacks were much less effective.

Administration was always a difficult problem, even in Assam. The antiaircraft officer for the operational area was in charge of tactical disposition of all the widely scattered units and was held responsible for all functions, with additional antiaircraft continuing to come into the theater from time to time. This condition eventually became entirely too clumsy, and in June 1944 an Antiaircraft Artillery Group was activated. Airborne battalions of varying size were formed from machine-gun batteries, the composition of a battalion being determined by geographical location of its batteries. Seldom did a battalion have more than one of the batteries deployed within easy administrative reach.
ANTIAIRCRAFT OPERATIONS IN THE CHINA-BURMA-INDIA THEATER

but at least the situation was not impossible.

In subsequent operations every effort was made to keep the battalions as nearly consolidated as possible, so that each battalion commander could visit his units frequently with a minimum expenditure of time and gasoline and so that radio communication would be as dependable as possible; but battalion control is occasionally difficult.

THE CHINA PHASE

This assignment, in support of "Y" Forces in West China, was very nearly the most rugged of the lot. The climate was not quite as foul as the Assam variety, but the terrain was like something out of a bad dream. Once a unit went into West China, it was cut off from normal contact with the rest of the world. All supplies had to be flown in, then trucked for two days from the depot to the troops. All communications were radio, and as radio performance anywhere in the region can only be described as frealish, communications were hardly dependable.

Both 40-mm guns and machine guns were used as ground support weapons as well as antiaircraft. Possibly the adventures of the machine-gun batteries were the most outlandish, if only for the reason that they could be hucked up and down mountains where it was impossible to take a forty.

Never did airborne antiaircraft feel more completely grounded. For moves, pack animals were employed as much as possible, but just as often "shank's mare" was called into play. On one occasion it took a day and a half to get four machine guns, their crews, and the necessary equipment to the top of a 1,500-foot "hill." Chinese soldiers provided the muscle to move the guns up. The trail appeared to climb the side of the hill at an angle of ninety degrees. So steep was the ascent that steps were cut into the hillside for seventy percent of the trail. To make matters worse, it had been raining in typical monsoon fashion for five days and the mud was ankle deep.

Another time, on another hill, it required sixty horses and mules and thirty coolies to pack up six guns, and supplies and equipment for eighteen men. The trail was fit only for mountain goats; and to add to the discomfort, the Chinese guided some of the men in the wrong direction. But they got there eventually, despite the constant rains and exhausted gun crews.

In August and September 1944, one machine-gun battery in particular was kept busy in the Sungshan campaign helping to clear the Burma Road of Jap resistance from the China side down as far as Luling so that supplies to the Chinese XI Group Army might be moved by truck. On numerous instances their caliber .50's supported charges by the Chinese troops or repulsed Jap counterattacks. When weather permitted, various Jap installations were "strafed" by the machine guns.

With the aid of a 19½-power telescope, accurate fire control could be obtained by observing armor-piercing hits or incendiary bursts. Using this method, guns on the Kum Lung Po Hills destroyed a combination rice depot and ammunition dump, and one other ammunition dump was blown up. On another occasion, harassing fire at 3,100 yards range was placed on a Jap-occupied village with good effect.

On the afternoon of 7 September, the curtain fell on a complete Chinese victory in the Sungshan. The machine-gun battery then set up to protect a Salween River bridge crossing.

Spread-beam searchlights have been used in conjunction with the automatic weapons in the interior of China. They have been valuable as homing beacons for lost pilots also.

SUPPLY

Supply conditions have been variable, ranging from fair to bad. Airborne units under limited T/E's [Tables of Equipment] are most seriously handicapped, though all units suffer from lack of automotive and ordnance replacement parts. Organizational personnel must perform all echelons of maintenance possible with such facilities as are at hand, for lack of maintenance units,
The supply problem will always be critical in the China-Burma-India Theater. Most supplies must come more than half way around the world by boat, must be freighted up the Brahmaputra River on barges or come up by rail from Calcutta to Ledo, and from there must be trucked or flown to the using units. Otherwise it is air transport all the way.

War and the Atom

Digested at the Command and General Staff School from an article released by British Information Services Press Service.

About 1918 two British scientists, Rutherford and Chadwick, had established the principle of disrupting the nuclei of certain atoms, and as the second World War approached, the Germans concentrated on the task of releasing atomic energy for destructive purposes. If they had won that race, a prize would have been in possession of the "master race" that would have transformed the war in their favor.

Behind the battle fronts, the best scientific brains of both sides were engaged in a grim secret struggle. At any time a major victory of that unseen front might have turned the scale. The Allies were ahead of the enemy in the crucial field of atomic research, but the Germans were ahead of us in certain other fields (such as radio-controlled projectiles) which might have delayed victory and caused appalling losses before the Allies could have brought atomic energy into play.

By the summer of 1941, a committee of leading British scientists, presided over by Sir George Thomson, reported that substantial progress had been made and that there was a reasonable chance that an atomic bomb could be produced before the end of the war.

Under a general arrangement then in force for the pooling of scientific information, this committee was constantly exchanging ideas with scientists engaged in parallel work in the United States.

In October 1941, at the instance of President Roosevelt, it was decided that British and American activities should be amalgamated into a joint effort, and some British scientists accordingly proceeded to the United States. By the following summer the Anglo-American team had made such progress that a decision had to be made about the setting up of production plants on the vast scale that the progress required.

While a group of British and Canadian scientists set to work in Montreal to investigate methods for making the material required for the atomic bomb, and the Canadian Government took steps to guarantee and increase the supply of uranium, the American Government devoted $2,000,000,000 to the project. Three great production centers were constructed and, at the peak, a staff of 125,000 was employed.

"The whole burden of execution," write Mr. Churchill, "including the setting up of the plants and many technical processes connected therewith in the practical sphere, constitutes one of the greatest triumphs of American, or indeed human, genius of which there is record. Moreover, the decision to make these enormous expenditures upon a project, which, however hopefully established by British and American research, remained nevertheless a heart-shaking risk, stands to the everlasting honor of President Roosevelt and his advisers."
MILITARY NOTES
AROUND THE WORLD

GREAT BRITAIN

Royal Navy's Balance Sheet:

The naval adviser to the British Information Services gave the balance sheet for the British Royal Navy at the end of five and a half years of war. The number of enemy ships destroyed by the British Navy was as follows:

GERMAN

Capital ships, 3; cruisers, 3; destroyers, 38; torpedo boats, 7; U-boats (about up to end of July 1944), 500; surface raiders, 4.

ITALIAN

Capital ships, 1; cruisers, 12; destroyers, 51; torpedo boats, 12; submarines, (about) 15.

The price of Admiralty was high. The British Navy sustained these losses:

PERSONNEL (in first five years)

Officers.—Killed, 4,129; missing, 532; wounded, 1,421; prisoners of war, 670.

Enlisted men.—Killed, 38,892; missing, 3,422; wounded, 11,152; prisoners of war, 4,751.

WARSHIPS

Battleships, 5; aircraft carriers, 7; cruisers, 28; destroyers, 126; submarines, 69; armed merchant cruisers, 14; corvettes, 28; frigates, 10; sloops, 14; minesweepers and mine layers, 51; monitor, 1; smaller craft, 255.

(The Army and Navy Register)

"The Tulip":

Introduced for the war's last great battle in Europe, the "Tulip"—a Sherman tank firing Typhoon rockets—was conceived, evolved, and tested in a single day, a model example of cooperation between the Army and the Royal Air Force.

It all began with an officer of an armored battalion of the Coldstream Guards saying in his squadron mess on the Western Front, "Why not try fitting Typhoon rockets onto our tanks?"

A visit was paid to a neighboring Typhoon airfield, and the RAF commander handed over a supply of rockets which a modification in the Typhoon's launching gear had rendered out of date. He lent an RAF fitter who, working with the Guards fitters, quickly devised equipment for housing and launching the rockets, one on each side of a tank.

(The Sphere, Great Britain)
British Bridging Tanks:

British tanks which carry and lay their own bridges played an important part in the liberation of France, the advance across Germany, and the campaigning in Burma. They are operated by crews within the tanks so that they can be used under fire for crossing small rivers and canals, surmounting antitank ditches and emplacements, and for scaling cliffs, sea walls, and other obstacles.

One type of bridging tank consists of a thirty-foot steel trackway mounted on a Churchill tank hull. The bridge is raised by a pivot arm from the tank hull, carried forward, and lowered across the gap in front of the tank, which then withdraws to make way for other vehicles to cross (Figure 1).

The Twaby Ark, shown in Figure 2, is driven directly into a gap and the ramps are lowered to enable vehicles to pass over it.

Another type of Ark consists of two trackways made of hornbeam sections of a small box girder bridge. They are fixed together to form a bridge projecting in front of the tank. Figure 3 shows an Ark forming a ramp against a sea wall. In Figure 4 a Churchill tank is successfully scaling the wall.

(British official photos)
MILITARY NOTES AROUND THE WORLD

GERMANY

Midget Submarines:

During the closing months of the war, the German Navy made extensive use of midget U-boats in a determined but vain attempt to interrupt the flow of Allied supplies to the Continent.

The German Navy employed three types of midget U-boats during this campaign. They were the Biber, the Molch, and the Seehund.

The type known as Biber is a one-man U-boat with a surface displacement of six tons. The length is twenty-nine feet six inches and overall beam four feet nine inches. It is armed with two modified electric torpedoes, slung one on either side outboard. Propulsion is by petrol engine and by electric motor, and the air intake enables the Biber to proceed on engines with the hatch closed. The maximum surface endurance is about 100 miles, and the average human endurance not more than forty-eight hours. Submerged endurance has been estimated at five and a half hours, but is likely to be longer.

Molch is a one-man midget U-boat with an overall length of approximately forty-six feet and beam of about seven and a half feet. Its armament is similar to that of the Biber.

The Seehund, shown in the picture under inspection by British naval officers, is a two-man midget U-boat. There is a marked similarity between the Seehund and the prefabricated U-boats, of which the Seehund is a miniature. The Seehund has an overall length of thirty-nine feet, with a depth of six feet and a displacement of sixteen tons. It is propelled by Diesel engine and electric motor, and has a surface speed of eight knots, with a submerged speed of between three and four knots. Its armament consists of two 21-inch modified electric torpedoes fitted with magnetic pistols and net-cutters, with an estimated performance of eighteen and a half knots up to 6,000 yards. It has an approximate endurance of 275 miles at eight knots surfaced, plus about fifty miles at three knots submerged. The submerged endurance can, however, be increased by charging batteries on the surface.

(The Sphere, Great Britain)

Minesweeping Devices:

According to German papers, the "hollow rod" and the "noise-making buoy" defeated one of the most dangerous weapons of the war, the British airborne mine. These mines have two fuzes; one is operated acoustically, the other magnetically. The noise of the ship's propeller makes the fuze active, while the hull of the vessel sets the magnetic device into motion. For this reason, German minesweepers were equipped with two new devices: The Gerauschboje (noise-making buoy), similar to the paravane, was fitted alongside the vessel in order to make a noise like that made by the propeller. Towed behind the minesweeper was a hollow cylinder containing a big magneto intended to blow up the mine at distances up to 300 feet.

(The Aeroplane, Great Britain)
CHINA

Chinese Combat Command:
The Chinese Combat Command (Provisional) in the China Theater of Operations is composed of American (not Chinese) personnel of the United States Army. It does not command Chinese troops—all Chinese ground forces are under Chinese command.

It is a combat organization, because Chinese Combat Command personnel go into the field advising and physically assisting selected units of the Chinese Army to organize, equip with certain American items, instruct in effective use of this equipment, and take into combat an effective Chinese military striking force. Chinese Combat Command personnel supervise the distribution of American equipment and supplies from the Services of Supply division dump right out to and including the most forward American-sponsored Chinese units in contact with the enemy.

Chinese Combat Command is a U. S. Army command, for the American combat sections which work with Chinese military units always remain under U. S. Army jurisdiction, with the American chain of command stretching direct from the smallest field unit through the appropriate Chinese Combat Command Field Headquarters to Chinese Combat Command Headquarters and thence to the Headquarters of the United States Forces, China Theater. Chinese Combat Command personnel, on the other hand, never command Chinese but act in a close advisory capacity.

Because of difficulties of communications and the limitations on equipment and personnel, the Chinese Combat Command can lend close assistance to only selected units of Chinese Army groups, armies, and divisions, the ultimate objective being to create a Chinese striking force to meet the Japanese in battles for the liberation of the Asiatic mainland from Japanese influence.

(From a release by Headquarters, Chinese Combat Command [Provisional], United States Forces, China Theater, June 1945.)

UNITED STATES

New Navy Helicopter:
Described as the first helicopter designed for air transport operations, the Navy-contracted P-V Engineering Forum Inc. XHRP-1 uses a novel tandem arrangement of two rotor units to lift a forty-eight foot fuselage, crew of two, and ten passengers.

The new craft has been sponsored by the Navy in an effort further to develop specialized aircraft for the evacuation of wounded and for the rescue of men at sea and in spots ashore that are otherwise inaccessible.

The tandem rotor arrangement, which places one rotor fore and one aft of the thirteen-foot thick fuselage, is proclaimed by the builders as the first successful usage of such a configuration.

The craft has been designed also to effect rescue of stranded men without touching the water or ground. Hoist mechanisms lift the men while the helicopter hovers above them.

The main quality claimed for the craft, however, still remains that of space.

The powerplant for the helicopter is a Continental-Wright R-975 engine that is completely enclosed aft of the cabin, power being fed to both rotor units from there.

(Aviation News)
Recoilless Rifles:

The 57-mm and the 75-mm recoilless rifles, two new weapons which were battle-tested in Europe, have been used against the Japanese with much success. Developed by the Ordnance Department, the new guns have put into the hands of the infantry soldier the striking power of field artillery. The weight and size make the 57-mm a shoulder weapon, while the 75-mm fires from a standard machine-gun tripod.

The new weapons embody all the principles of standard field artillery, but the recoilless element makes the ponderous recoil mechanisms of field artillery no longer necessary. Since they are light enough to be transported by two men, heavy-wheeled carriages are not needed.

The smallest piece of American field artillery weighs well over a ton, while the 57-mm recoilless rifle weighs only forty-five pounds, and the 75-mm rifle 110 pounds. The 57-mm rifle, which is sixty-one inches long, fires a high-explosive shell weighing nearly three pounds a distance of two miles. The 75-mm rifle, eighty-two inches long, fires a 14-pound high-explosive shell more than four miles. Both rifles shoot with the accuracy of a sniper’s weapon.

Ever since firearms were invented, many attempts have been made to reduce the recoil or “kick” that occurs when a weapon is fired. There is absolutely no recoil in these new guns. Although they resemble rocket weapons, they use conventional artillery shells. The normal recoil is absorbed by allowing a controlled portion of the propellant gases to escape through openings in the breech of the gun. The force required to drive the shell through the rifled gun tube is exactly counterbalanced by the gases emerging through these openings.

The 57-mm recoilless rifle can be fired from the shoulder in either the standing or sitting position, or from a small bipod attached to the gun with the gunner lying prone on the ground. Both the 57-mm and the 75-mm rifles are handled by a two-man team.

Recoilless weapons, because of their light weight, are especially adapted for use by airborne troops. The 17th Airborne Division used these weapons in an airborne operation across the Rhine River in March 1945.

(Bureau of Public Relations Press Branch)
Jet-Propelled Fighter, Shooting Star:

The P-80 Shooting Star, jet-propelled combat plane of the Army Air Forces, is believed to be the fastest fighter in existence. It has a speed in excess of 550 miles per hour, a service ceiling of more than 45,000 feet, and an armament of six .50-caliber machine guns.

The canopy is mounted well forward of the wing to give improved visibility for the pilot. There is an armor-glass windshield, and steel armor plate affords the pilot complete protection. Each wing tip is equipped with shackles for bombs or dropable fuel tanks. The main landing gear folds inboard into the wing and is operated hydraulically. The nose wheel has a rotation of forty-five degrees to either side.

Larger and greatly improved over the engine used in the Bell P-59a, the P-80’s power plant is a light, compact unit which may be easily removed and replaced. A complete engine change can be made in twenty minutes, and the engine is air cooled.

The P-80 requires no warm-up for take off. The engine may be started and the plane under way in less than a minute. Unlike conventional aircraft engines, the efficiency of the gas turbine increases with speed and altitude, making the P-80 particularly suitable for pursuit. The only engine control is the throttle.

The first P-80 engines were designed to operate on kerosene, which reduces altitude fuel problems and fire hazards. With modification of the fuel system, however, the P-80’s engine can operate on gasoline of any octane with approximately the same efficiency. Availability will determine which fuel will be used in large-scale operations.

(Bureau of Public Relations Press Branch)

Naval Research:

A new office of Research and Inventions to guide naval research activities has been established.

In the new office were merged the Naval Research Laboratories, the Special Devices Division of the Bureau of Aeronautics, the Office of Research and Development, and the Office of Patents and Inventions.

Jet propulsion, rockets, gas turbines, and numerous other still secret devices will be studied by the new office.

(From a news release)
Lessons of the Air War

Digested at the Command and General Staff School from a series of articles by Major F. A. deV. Robertson in *Flight* (Great Britain) 17 May, 24 May, 31 May, and 7 June 1945.

Securing the Base

Said Field Marshal Montgomery at the close of the Africa campaign: "We first win the air battle; then we win the land battle." He spoke of tactical operations, but his remark is equally true of the strategy of the war against Germany. That war could never have been won by the United Nations without a secure base. That base could only be the island of Great Britain. Without that base not all the vast power of the United States could have defeated Germany, for the American Army could never have got ashore on the Continent of Europe.

The German Army could not march into Great Britain as it had marched into Poland and France, and the German Navy was quite powerless to face the Royal Navy in a fair and square sea fight. But if German air power could bomb the British fleet out of the Channel, then it seemed to Hitler and his band of strategists that an overwhelming German force might be ferried across the Channel.

Therefore, it was necessary for the Germans to win the air battle before winning the land battle.

It does not seem to have been always apparent to Goering and the other chiefs of the Luftwaffe that winning the air battle is a matter of fighters. They had made experiments in the Spanish Civil War, where the few fighters opposed to them were not first class. The chief deduction which they drew from their experiments was that speed was the greatest desideratum in both fighters and bombers. Speed, they held, was the best protection which they could give to their bombers, and armament was a negligible consideration. So Goering put on large-scale production the Heinkel He 111, the Dornier Do 17 and 215 bombers, and the Messerschmitt Me 109 fighter. He committed the factories so wholeheartedly to the production of those types that it became impossible to make a rapid change. There seemed at the time to be ample excuse for the policy. The top speed of the He 111 was nearly 275 miles per hour. That of the Do 215 was about 312 miles per hour and of the Dornier 17 (sometimes called "the flying pencil") about 310 miles per hour.

At the time when Goering, so to speak, went Nap on these types, the best British fighter was the Gauntlet biplane with a speed of only 210 miles per hour, while its successor, the Gladiator, could only muster rather under 250 miles per hour. The German bombers could easily fly away from such fighters; and, had they ever been matched in combat, the lessons drawn from the Spanish Civil War would have been proved valid. But between Goering's fateful production order and the outbreak of war certain things happened in Great Britain. The Hawker firm produced the Hurricane monoplane which had a top speed of 325 miles per hour, just a little less than that of the Me 109, but the Hurricane was far the
more maneuverable of the two. About the same time, the great Supermarine designer, R. J. Mitchell, produced his masterpiece, the Spitfire. The first mark of that type was slightly faster than the Messerschmitt, while later marks have a top speed of 450 plus miles per hour.

At the time of the production of these two masterly fighters, a momentous decision was taken. This decision was that the new fighters should each be armed with no fewer than eight Browning guns apiece. The caliber was .303, similar to that of the Army’s service rifle.

So it came about that when the Germans decided to conquer Britain from the air, some of their pilots had had experience of the Hurricane, but none of them had yet fought a Spitfire. But the Luftwaffe as a whole had but little knowledge of the type, or for that matter of the shattering effect of fire from eight guns.

So, light-heartedly and full of the insolence begotten of easy victories in Poland, Norway, and France, the Luftwaffe set out to beat Fighter Command and clear the way for a German invasion of Britain. One knows that three Fighter Groups were concerned. No. 11 Group occupied the inner ring of airfields round London: North Weald, Hornchurch, Northolt, Kenley, Biggin Hill, and others, with Manston, Hawkinge, and Tangmere on the coast of Kent and Sussex. This was naturally the hardest-worked group. No. 12 Group looked after the North Sea coast from Duxford northwards. No. 10 Group had the rest of the south coast and the west of England, and had to contend with furious raids on Portsmouth, Southampton, Plymouth, etc. These groups had to help each other on many occasions, and it must have often been a nice point for Fighter Command to decide when to reinforce a certain group without leaving important places inadequately protected.

We all know that it is desirable to attack from above, and to dive out of the sun; but there is much more to it than that. Skilful leaders of groups and wings were able to impose their will upon the enemy, and make him fight as they wanted him to do. In the main it may be said that the object was to destroy enemy bombers without giving a free hand to the escort of Messerschmitts overhead. Sometimes, however, the best tactics were for the front rank (so to speak) of British fighters to attack the escort and disorganize it, leaving the bombers unprotected to be dealt with by our second and third lines.

All planning, of course, depended on prompt information and plotting of approaching raids. The Germans did not know, nor did the British public at that time, that we were using radiolocation. Quite possibly that invention saved us from disaster. None the less, great credit is due to the Royal Observer Corps, which worked ceaselessly and hard to report the approach and the course of the raids. Its work was invaluable.

The Battle of Britain may justly be deemed one of the decisive battles of the world.

One lesson the British people have learned and must not forget. Victory is not possible without air power; air power cannot be brought to bear without air superiority; and air superiority must be won mainly by fighters.

Air Power in Attack

A bomber force must be flexible. It must be prepared to support the work of the Royal Navy; it must be ready to lend help to the Army; and it must also carry out independent operations such as striking at enemy war production. This last class of work is commonly called strategic bombing, because it is not connected with any definite battle. But no sharp line separates strategy from tactics, and attacks on war production, it may be argued, are certainly intended to help the other Services by depriving the enemy of armament with which to fight. This was particularly the case when British and American bombers, shortly before the landing in Normandy, concentrated their attacks on the German factories which produced fighters and on the enemy’s fighter.
airfields. These attacks went far to ensure for the Allies a definite supremacy in the air which greatly smoothed the path of the invading armies, and so contributed mightily to the complete collapse of Germany eleven months later.

Some time before the war broke out, Britain decided that the best help she could give to her Allies, while her Army was being raised, trained, and equipped, was to prepare a force of bombers that could strike beyond the battle lines at the sources of the enemy’s fighting power.

During the war it became apparent that what really mattered in a bomber offensive was the weight of explosive dropped. Next in importance, perhaps, was concentration of attack. By very careful and brilliant staff work at the headquarters of Bomber Command, it was found possible to decrease progressively the time in which hundreds of heavy bombers could unload their cargoes onto a given target. These tactics saturated the defenses, and made it impossible for the civil defense parties in the doomed cities to get to work until the damage had been done. Often, too, these terrific salvos overwhelmed the antiaircraft gunners down below; while defensive fighters had little time to tackle the bombers unless they had previously discovered the objective of the attack and had made early contact with the raiders. This often happened, though there were a number of cases in which clever routing of the raid and feint attacks on other places misled the defense.

When it was known or suspected that German armament works were widely dispersed through a district, employing bicycle shops, cabinet makers, and so on, it became necessary to blot out the area. In such cases it was often found that fire was the most certain agent to do the work, and many thousands of incendiaries were dropped in a few minutes. It was impossible for the fire brigades to tackle all the conflagrations, and if high-explosive bombs were coming down at the same time, the brigades ran a grave risk by venturing into the streets.

As the war progressed, it was learned that where there was much dispersal of armament manufacture throughout industrial districts of a city, there was often an assembly factory, the keypoint of the whole system, standing alone at some distance from the city. Night bombing on the area principle could not make sure of obliterating that factory. It became the usual thing to request the U.S. Army Air Force to fly to that place in daylight, and with the help of its remarkably accurate bombsights to destroy that building. Towards the end of the war the RAF was also in possession of an extremely accurate bombsight; while with the help of radar instruments it became able to hit individual targets through fog and cloud.

The United States Army Air Forces were gradually built up in the United Kingdom until they exceeded the numbers at the disposal of Bomber Command. Their Flying Fortresses and Liberators had been designed for day bombing, and their aircrews had been trained in that form of operation. The machines had ample tankage, which gave them a good range, but the bomb bays were not designed to accommodate large bombs. The American case was that the accuracy of their bombsights made heavy bomb loads unnecessary, for a moderately powerful bomb planted right in the bullseye was more effective than area bombing, which might well spare the most important building. For defense they trusted at first to two things, the great height at which they customarily flew, which would naturally increase the difficulties of the flak gunners, and to their heavy armament of thirteen machine guns, nearly all of .50-inch caliber. Without doubt they shot down a great many German fighters, but they also lost a number of heavy bombers. They ultimately found salvation in the employment of long-range escort fighters, the Mustang and the Thunderbolt, to which they fitted long-range tanks of British make. The Mustang, in particular, proved a most admirable machine.

Offensive air operations were not undertaken only by Bomber Command. Once the Battle of Britain had been decisively won
(and incidentally that battle is a shocking bad example of air power in attack), Fighter Command also began to assume an offensive role. At one time it could truly be said that fighters were purely defensive weapons—perhaps the only purely defensive weapons in the world. But presently that characteristic of the class was changed. The fighter-bomber proved to be more effective than the Stuka in attacking ground troops. When Britain no longer needed protection from the attacks of the Luftwaffe, Fighter Command declined to kick its heels in idleness. It began to send formations across the Channel, looking for trouble in France. Its machines were by then mostly armed with 20-mm cannon, and with them the Spitfires and Mustangs attacked railway engines and transport trains. This was the beginning of a policy of interfering with German communications in occupied countries, which presently swelled to enormous dimensions. But at first the main object of our fighters was to provoke enemy fighters to meet them in combat. The German pilots were doubtless willing enough, but their authorities said “No.” Fighters were getting precious in the Fortress of Europe, and must not be risked except for a very good reason. So medium bombers were sent out with the Spitfires and Mustangs, and then the Germans found that they must offer opposition. Our losses were proportionately higher than in the Battle of Britain, because the pilots who bailed out were made prisoners of war. But the RAF could afford their losses better than the Luftwaffe could afford theirs. British production was getting into full swing, and a Spitfire was no longer a valuable rarity. We could even spare Spitfires to the French when they attacked Corsica.

When the Allies swept into Germany and saw from the ground the damage which bombing had done to innumerable German cities, they were astonished. The photographs taken from a height of five miles had never told the full story. The Ruhr had been blasted to destruction, and its industries could give no help to German defense.

Air Power and Sea Power

One of the great lessons of the late war with Germany and also of the present war with Japan is that sea power must be supported by air power. It cannot do without it. Aircraft are as necessary as destroyers in the composition of a fleet. To send out warships without the support of aircraft is to ask for trouble, as the Royal Navy learned to its cost in the grievous loss of two capital ships off Malaya.

Before going farther, it will be as well to note that naval air power does not consist only of carrier-borne aircraft. It needs also shore-based squadrons, some equipped with flying boats and others with landplanes. These were provided by Coastal Command of the Royal Air Force, which we shall consider later on.

One of the main points to note in the recent and present wars is the great increase in the reputation of the aircraft carrier. Mussolini and his Fascist Ministers, whose object was to dominate the Mediterranean, decided not to build carriers. They believed that their purpose could be achieved by a Navy working with long-range bombers, provided that the latter had plenty of bases. The Royal Navy, however, sent carriers into the Mediterranean, and scored heavily by doing so. Not much is known yet about Japan’s naval policy in late years; but it is thought that she believes in having large numbers of small carriers. It was with carrier aircraft that she struck her treacherous blow at Pearl Harbor.

Once the United States began to arm in earnest, her policy was to build many carriers and large ones. The great distance between her bases and the islands seized by Japan made such a policy inevitable. Until forward bases could be seized, American shore-based bombers could not be brought into action; and until Japanese naval power had been reduced, such bases could not be seized. The American policy was vindicated in an almost startling manner.

At the regrettable, but inevitable, affair at Oran, it was first demonstrated that torpedoes dropped from the air could do
serious damage to a capital ship. The victim was the battle cruiser Dunkerque. She was afterwards repaired. At Taranto it was shown that ships in harbor need elaborate protection if they are to be kept safe from torpedo-carrying aircraft from a carrier. At the battle of Matapan the Italian ships were faster than the British, and would certainly have escaped if torpedo-aircraft from HMS Formidable had not flown ahead of Admiral Cunningham’s fleet. The superior speed of the Italian ships was thereby made unavailing. As a result, the battleship Vittorio Veneto was badly damaged by a torpedo, and the British fleet came up in time to sink the cruisers Pola, Zara, and Flame with gunfire. But there were many Italian forces at sea, and the Formidable had not enough aircraft to maintain touch with them all and at the same time to build up a striking force strong enough to deal with the crippled battleship. So the Vittorio Veneto got back to her base. The lesson from this action is that a fleet needs as many carriers as possible, and large ones at that. One cannot have too many aircraft in the sky. This is particularly true when the enemy aircraft are shore-based and therefore are likely to outnumber those from any one carrier. It also appeared that the 18-inch torpedo carried by aircraft could cripple, but not necessarily sink, an armored warship.

The sinking of the Bismarck was another case in which the far-seeing eye of aircraft discovered a flying enemy with which our surface ships had lost touch.

At first the duties of the Coastal Command were reconnaissance over the seas round the British Isles, escorting our shipping convoys, and watching for submarines. These duties it continued to fulfil until the end of the war in Europe; but many more were added to them. Its greatest work was the part it played in the Battle of the Atlantic, and that work constantly called for more and ever more range and air endurance.

The enemy attacks on the convoys were made by long-range aircraft (Kondors) as well as by U-boats. The Kondors did not take much aggressive action themselves, but they spotted our ships and reported to the U-boat packs. Hudsons and other machines of Coastal Command invariably attacked the Kondors when they saw them, and the latter rarely showed much fight. Fighting was not their job, and the crews knew that if their machine was badly damaged in the middle of the Atlantic the chances of getting home safely were slight.

In time, Liberators and Halifaxes were added to the coastal fleet, and depth charges were carried instead of bombs. An excellent system of cooperation between the aircraft and the surface escort vessels was built up, and whenever possible the aircraft which discovered a U-boat, after dropping its own depth charges, would summon destroyers or corvettes to continue the attack. The surface vessels naturally could carry more depth charges than the Liberators could, and could make attack after attack. Still, a substantial number of U-boats fell victims to the aircraft. The warships and the aircraft established a complete understanding.

At the beginning of the war, the American Naval Air Service, like our own, suffered from shortage of machines. Consequently, at first the U.S. Army Air Forces escorted the convoys on the western side up to the limit of their range. Later on, the U.S. Naval Aviation took the job over.

But for a long time there remained a gap in mid-Atlantic which could be covered by neither nation. Hurricanes catapulted off the decks of merchantmen were first used to attack the Kondors in the gap. They filled the German crews with still more dread; but the plan was expensive. The Hurricanes could not be landed on again and had to be abandoned. Sometimes the pilot was also lost after parachuting down into the sea. The small escort carriers relieved the situation, for they could carry reconnaissance machines as well as fighters; and it was possible (though not easy) to land on their small flight decks. Finally, very long-range aircraft were made available, and then the “gap” ceased to be a happy hunting ground for U-boats.

Through the combination of sea power
and air power the Battle of the Atlantic was finally won by the Allies. The Admiralty and the Air Ministry worked in the closest collaboration in deciding the plan of campaign.

**Air Power and Land Power**

The German war brought home to most of the belligerents lessons which they ought to have learned for themselves in the days of preparation, but which had not been grasped in full. Some of them realized the importance of those lessons as the conflict went on and tried to put them into practice. Of these, some were successful, while others found that they had started too late.

During the last seven months of the first World War, Britain had formed the Royal Air Force as a separate Service. The Independent Air Force gave the German industrial cities in the Rhineland a foretaste of what strategic bombing might one day come to be; but the period was too short and the bombs were too light to make much impression on military thought. The broad fact remained that the Royal Air Force, like the air arms of France and Germany, existed chiefly to help the armies on the ground.

It has been described how the Air Ministry decided that in a future war the best help which Britain could give to her continental Allies would be to raise an aggressive force of bombers which could attack the enemy's centers of war production. Experience has shown how effective this policy became.

It was less creditable to British military thought that the question of using air power to assist land power was scarcely studied at all. One must admit that for many years the Government's policy of economy and disarmament prevented the Air Ministry from raising as many air squadrons as it would have liked to do. But this is not an excuse for what can only be called the shelving of the whole question of air support for ground troops. No serious attempt seems to have been made to formulate an air-land doctrine.

Consequently, when war broke out in 1939, the strong position existed that in Germany and Russia the air force was extravagantly army-minded, while in Britain it was hardly army-minded at all. Russia, perhaps, was justified by results; it is rather hard to say. Germany and Britain, in turn, had to pay dearly for concentrating to excess on one or two aspects of air power and for failing to realize that in these days the air enters into every sort of military operation, and that to forget or neglect air power is asking for trouble. Britain's first bitter lesson was when her Army was driven out of France and the Low Countries. Germany had to swallow her first dose of medicine in the Battle of Britain. In that decisive struggle it was air attack versus air defense, and the Luftwaffe was like a lost sheep.

Mention has been made of the four squadrons which for a number of years constituted the whole permanent provision made by the Air Ministry for the needs of the Army. These units were called Army Cooperation Squadrons, and it is not improbable that this high-sounding name misled even Members of Parliament and Treasury officials into thinking that they provided for all the needs of the Army. Actually they were only tactical reconnaissance squadrons. It was also laid down that when an expeditionary force went overseas it should contain an Air Component of fighter and bomber squadrons in addition to the Army Cooperation Squadrons, and that the General Officer Commanding should have operational control over this component.

Lord Gort took an Air Component with him when he led his army into France in 1939. We need not recount the melancholy story which ended at Dunkirk. It is enough to say that it was obvious to everyone that air support for an army was a subject on which British authorities were lamentably ignorant.

The scene changes to the Middle East. There at first General Wavell commanded the Army and Air Chief Marshal Longmore was AOC-in-C [Air Officer Commanding in Chief] of the Air Force. We have been told that they
lived in the same house in Cairo and worked together in the closest cooperation. But we had no air weapon which was effective against tanks, and the German tanks were superior to ours. So, in spite of our air superiority, General Auchinleck was driven back to Alamein.

The Prime Minister visited the Middle East, and on his return he told the House of Commons that he had directed the Air Force to carry out the intentions of the army commanders, even if it meant abandoning some tempting targets. From that order dates the 1st Tactical Air Force (TAF), and from that moment all went well.

If further proof were needed of the change which had come over the scene and of its appreciation in the highest circles in London, it would be found in the abolition of the Army Cooperation Command and the formation in its place of the 2d Tactical Air Force in Great Britain.

Without intelligent and effective air assistance, the Allied armies could never have made good their landing in Normandy. With that assistance they broke the German forces in the west in eleven months at comparatively light cost.

The lesson for the future needs no further stressing.

Criticism from Below

Translated and digested at the Command and General Staff School from an article by Captain G. Zeugin in Schweizerische Monatschrift fur Offiziere aller Waffen (Zürich, Switzerland) December 1944.

CRITICISM usually excites an unpleasant reaction. If it comes from above, with all the weight of the higher authority of a superior command or service, it is simply to be accepted. Criticism from below, however, appears contrary to the principles of authority and unqualified obedience and has, seemingly, absolutely no place in the hierarchical military structure. Criticism from below is, therefore, usually regarded as unmilitary, and is rejected; and the critic, branded as a disagreeable and querulous inferior, easily falls into the greatest of disfavor.

This summary rejection of criticism from below has its origin—whether admittedly so or not—in the idea that every superior officer, by virtue of his military office, is of divine infallibility and as unapproachable as a king within the confines of his sphere of authority. The young officer, particularly the newly appointed unit commander, must, indeed, possess such an attitude, to some extent at least, in order to be able to come up to the requirements of his position. But older officers and commanders, with increased experience, also acquire increased awareness of the fact that their position is anything but divine, that their knowledge and ability are limited, and that their acts are not always above criticism. This realization, however, produces modesty, and this modesty, in turn, should make it possible not only to accept suggestions but also criticism from below.

By criticism from below I do not mean dissension on the part of one's troops with respect to one's decisions or that mouthy criticism on the part of men and cadres over their beer or wine, nor do I mean that lust for criticism that is displayed by the chronically dissatisfied or disgruntled grumbler who finds a hair in every plate of soup and who finds something with which to take issue in every command from above. Such criticism should, indeed, be noted by every superior officer, but it must not be heeded by him. Matters are quite different in the case of that concrete and impersonal criticism that is offered in an open and respectful manner to a superior officer by those of his co-workers who are directly under him.

The cause of such concrete criticism is always either actual or imagined mistakes the commander has committed in his commands or orders or in the measures he has adopted. The subordinate who, in the proper form, calls the attention of his superior
to such an error is, first of all, displaying the qualities of manliness, honorable-ness, and openness, and confidence in his superior, and this merits, at least, attention on the part of the superior officer. If the criticism proves to be justified, the superior officer may truly be glad that his attention has been called to the error, and criticism is thus seen to be a form of positive cooperation. If, however, the criticism that has been offered proves to be unjustified or groundless, the superior officer, through the medium of the criticism, will have been made aware of the differing or erroneous concept entertained by the subordinate, and will be able to take the necessary steps to change it.1

The nature of our own military system is at times responsible for the fact that, in certain fields, a subordinate possesses a better practical knowledge of a certain matter than his superior officer. This may be due to the activities of the subordinate in civilian life or to special military schooling or training. Where such better practical knowledge exists, it will be to the advantage of the superior officer to accept such criticism of his orders and act in accordance with it. Actually, it will be still better if he does not wait for criticism of his orders but obtains the advice and opinion of his informed inferior before he issues orders or adopts measures involving the particular points. Nothing but maliciousness or stupidity could motivate the charge of dependency when a commanding officer seeks the advice or help of subordinates who possess a practical knowledge of the subject under consideration, or when he takes their criticisms into consideration in the formulation of his orders. Charges of dependency or favoritism are justly made only in those cases where the informed subordinates have acquired too great an influence over the superior officer or where he permits himself to be advised and influenced by subordinates who are destitute of all knowledge, yet have been able to render themselves indispensable to a commander.

Frequently, it may even happen that a commander is lacking in understanding with regard to the particular conditions existing in a certain unit. A general order may then be very proper and justifiable in the case of the main body of forces, yet inappropriate or even impossible of fulfilment in the case of the smaller unit. In such a case, it is the duty of a subordinate officer to call the attention of the commanding officer to the conditions in this unit which the latter, perhaps, was not personally aware of, and to the inappropriateness of the general order in the case of this unit. Such action certainly seems more fitting from the military point of view than the blind execution of the order which is known to be erroneous in that particular instance and which would work out in a disadvantageous manner.

In the broad field of tactical conceptions and measures, differences of opinion often occur between commanders and their subordinates. As a rule, the commander is able to fall back on his greater experience and broader view. If the subordinate cannot be convinced of the superiority of his commander's concept, he is helped but little, down in his heart, by the simple command, "I want it done that way." By such methods, the superior officer produces in the mind of the subordinate an impression of high-handedness and the opinion that he is no longer sufficiently flexible, from the mental point of view, to keep pace with modern developments or even to follow the arguments of the subordinate. And so, from a simple difference of opinion, there develops a conflict between the two generations represented, and a state of contrariness between the fire of youth and the prudence of age. In all differences of opinion relative to tactical matters, it should be borne in mind that nothing but war is able to hand down a definite verdict, and that the soldierly factors of fearless commitment, of resolute steadfastness, and of unreserved self-renunciation are the decisive elements and not merely tactical forms. Let the superior officer, therefore, bear in mind, in cases where there are differences in tactical views such as these, that the subordinate is not able to commit.

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himself wholeheartedly when other persons' ideas are forced on him.

Criticism becomes an especially delicate matter when it betrays doubts relative to the field of authority of a superior officer. It is true that the Service Regulations require clarity in the matter of orders and commands, and definiteness with respect to spheres of authority and responsibility, as the basis of orderly service and discipline. In spite of this, however, it is observed with astonishing frequency that, in the case of detached units, great uncertainty exists in matters of command, and that, in abnormal situations, the task of definitely establishing the limits of the fields of authority of the various commanders is avoided. Uncertainties such as these frequently give rise, then, to unpleasant disputes with respect to these fields of authority, disputes which could so easily have been avoided. But even in those cases where the fields of authority have been definitely established by rules and regulations, it constantly happens that commanding officers, as the result of blind zeal, forget about these rules, or else intentionally disregard them and get over into the field of authority of some subordinate. This sort of encroachment is especially frequent in the field of disciplinary penal service, whether it is a case of a superior officer's imposing a summary sentence without the authorization of the unit commander or of an absolute conflict with the authority of the unit commander due to a false idea of centralization of disciplinary powers. In such cases of encroachment in spheres of authority by a superior officer, it is indeed the military duty of the subordinate to call attention to the said encroachment and protect his rights without, at the same time, being forced to seize the helm or lodge a complaint.

The superior officer who will absolutely not stand for concrete criticism from below but demands blind obedience reveals thereby an inner feeling of uncertainty which is quickly enough detected by his subordinates. He gives an impression of being despotic, stifles the impulse to soldierly and manly frankness on the part of his subordinates, and creates an atmosphere of distrust and inner hostility in which only flatterers and servile personalities are able to thrive, while more honorable natures shrink from him and adopt a policy of silence. And under such circumstances, fruitful cooperation is hardly imaginable. Under favorable conditions, this attitude may persist without any serious clashes.

The superior officer, on the other hand, who willingly listens to and accepts criticism even from below repays confidence with confidence and, above all, testifies to his respect for the frankness of the subordinate. Even when he is unable to see any particular value in the criticism of the subordinate, a discussion of it is of advantage to both parties and aids in the acquirement of a mutual understanding of one another. In cases where the criticism is fundamentally justified and the command of the superior officer has been incorrect in some respect, the latter must not hesitate to admit this and, if possible or necessary, either change or countermand his order. The superior officer need have no fear that such yielding will be construed as an indication of weakness on his part. Rather, in changing or countermanding an incorrect order, he displays a concrete objectivity and greatness of character that makes a deep impression on the subordinate. This is an experience of lasting value. The subordinate who is privileged to participate in such an experience will always feel himself indebted to his superior officer and have unlimited confidence in him.
The curious blend of audacity and caution which had characterized the Russian strategy in 1944 is pre-eminently exemplified in the story of the 1945 drive to Berlin. During the carefree gallop over the Polish plains in the latter half of January, Koniev's left flank became progressively exposed as he forged farther and farther ahead of Petrov's 4th Ukrainian Army, while Zhukov's right flank was completely open even before he passed beyond the Vistula elbow at Bromberg (see sketch) on 23 January. Any student playing a war game could easily have devised attacks against these open flanks—indeed, he could find one ready-made example from recent history in the attack which Hindenburg launched from the line Thorn—Posen against the flank of the Grand Duke Nicholas, when he was advancing over precisely the same ground in November 1914. That attack, culminating in the Battle of Lodz, had been decisive in thwarting the Russian plan, and it is reasonable to suppose that an attack on the southern flank could have been equally successful.

It is possible, however, that the Russian recklessness in January 1945, was more apparent than real. Their offensive was launched at a time when it was clear that the Germans had committed themselves to operations in the Budapest area; so the danger from the south could be, for the moment, ignored. As for the threat from the north, where it was known that large German forces were available, that was, to some extent, provided for by the parallel advance of Rokossovsky's Army between the Vistula and East Prussia.

Nevertheless, it is easy to trace in the operations of both Koniev and Zhukov a growing consciousness of the danger to their flanks, and the necessity of counteracting that danger had the effect of slowing down the rate of their advance in the main direction—and so of depriving them of the priceless weapon of speed. Thus we find Koniev, who had made such rapid progress westwards up to 23 January, turning his attention next to the south—and even to the southeast—to seek contact with Petrov. (Petrov, it must be remembered, was advancing over the very difficult country of the Carpathian foothills.) Zhukov also, who crossed the Brandenburg frontier on 31 January on his way to Frankfurt and Kustrin, is next seen to be mainly preoccupied with a northwestwards thrust in the direction of Stettin.

Those deflections from the pursuit of the main object were, of course, vitally necessary, and it is only unfortunate that they were so as, otherwise, Zhukov and Koniev would, doubtless, have crossed the Oder and Neisse "straight from the march" and Berlin would have been encircled and entered before the end of February. But war is always a two-sided affair—your side and the enemy's. And the enemy, in this instance, was still very strong.

So Zhukov reached the Oder on 5 February and Koniev the Neisse on 22 February. But they did not cross those rivers in force until 19 April.

The Southern Flank

It took Koniev more than two months to secure his left flank, and he had to do the whole thing himself. After clearing up the southeastern corner of Silesia at the end of January, he extended his flank protection northwestward along the upper Oder past Breslau during the first fortnight of February. Then, feeling reasonably secure, he resumed his westward advance, crossed the Brandenburg frontier on 15 February and, as has been stated, pushed on to reach the Neisse on the 22d.

For the next month the communiqués report nothing on Koniev's front except "reconnaissance activity" or street fighting in Breslau, which had been encircled on 16 February.
FOREIGN MILITARY DIGESTS

BALTIC SEA

KONIGSBERG
GODYNIA
DANZIG
ELBING

EAST PRUSSIA

DANZIG

STETTIN

POMERANIA

POLISH CORRIDOR

BROMBERG
TORUN (THORN)

VISTULA R.

WARSAW

FRANCONIA

DRESDEN

LUCAS

KOTBUS

SPREMBERG

DANUBE R.

VIENNA

HUNGARY

BUDEPEST

PRAGUE

LUGOS

RATIBOR

RYPNIK

VISTULA R.

CZECHOSLOVAKIA

SILESIA

POLSAN

WARSAW

BRATISLAVA

CZECHOSLOVAKIA

VIENNA

BUDAPEST

25 0 25 50 75 100 Mi

25 0 25 50 75 100 Km
On 22 March, Koniev struck again, but once more he advanced in a southerly direction, with the object of resting his left flank on the mountains of the Czechoslovak frontier. He followed this up with the capture, at the end of the month, of Rybnik and Ratibor at the mouth of the Moravian Gap—and then resumed his “reconnaissance activity.” The 4th Ukrainian Army, now under the command of General Yeremenko, had, meanwhile, closed up to the Moravian Gap, but the danger from that direction had, in fact, largely disappeared, since Tolbukhin started an offensive in western Hungary on 24 March and Mallinovsky followed suit on the 25th. The capture of Bratislava on the 4th and of Vienna on 13 April were quite enough to fix the German reserves on the southern front. So Koniev, by mid-April, was free to take up his main task again.

**The Northern Flank**

But if Koniev seems, perhaps, to have been unduly concerned about the dangers—which were, to some extent, problematical—from Silesia and the Moravian Gap, Zhukov had no doubt about the reality of the threat which overhanging his army from the north. Large German forces were known to be stationed in East Prussia, in the Danzig territory, and in the towns of the Polish Corridor and Pomerania, and these could be easily reinforced by sea from western Germany and from Courland (in Latvia, not shown on the map), where some twenty divisions were reported to be still holding out. Against these forces the Russians had sent into action two armies under Chernykovsky and Rokossovsky, but both these armies were, for a time, fully engaged in dealing with East Prussia alone. This was not altogether lost for the Russians, since the Germans, too, had a large proportion of their forces locked up in East Prussia—which illustrates the old military lessons about the fatal lure of fortresses. But the fact remains that Rokossovsky, for all his energy, was unable to provide a continuous flank guard for Zhukov’s impetuous advance. For example, he only reached Torun (Thorn) four days after Zhukov had passed beyond Bromberg, twenty-five miles farther west. It was not, indeed, till 10 February, when he had captured Elbing and so cut the main escape route of the garrison of Königsberg, that Rokossovsky was able to leave the reduction of East Prussia to the 3d Byelorussian army. Then he moved quickly, and by 15 February was driving into Pomerania on Zhukov’s right. Nevertheless, it was Zhukov who had to do the lion’s share in the cleaning up of Pomerania, and at the end of March we find troops from his army manning a hundred-mile stretch between Kustrin and the Baltic Sea—which was not the “Berlin direction.”

Rokossovsky spent most of March in liquidating the large pockets he had bypassed in his dash for Pomerania. But with the fall of Gdynia on the 28th and of Danzig on 30 March, the situation was at last clear for the regrouping necessary before the final drive for Berlin could be launched. During the first fortnight of April, Rokossovsky’s army moved up to the Stettin front, thus releasing the whole of Zhukov’s right-wing force to close in towards the Kustrin-Frankfurt area.

As Koniev also had now concentrated his main forces on the Neisse front, the next step of the Russian central armies was plain.

**The Final Drive**

It started on 17 April with “reconnaissance in force which developed into fighting for the capture and expansion of bridgeheads on the rivers Oder and Neisse.” By the 19th, Koniev had established four bridgeheads across the Neisse on a thirty-five mile front, while Zhukov crossed the Oder west of Kustrin. This quiet announcement in the Soviet communiqué hardly prepares us for the extremely rapid development of the situation which followed.

On 20 April, Koniev advanced a further nine miles through an area of woods and waterways, crossed the Spree at Spremberg, and at the same time made a thrust with his left wing in the direction of Dresden. This must have been something more than a reconnaissance in force since Koniev had to beat
off counterattacks by one motorized and three panzer divisions which the Germans sent up as reinforcements. Zhukov, meanwhile, had made an audacious dash to Freienwalde, which is thirty miles northwest of Kustrin, had advanced ten miles along the Kustrin-Berlin highway, and had made another crossing of the Oder five miles north of Frankfurt.

On 21 April, Koniev, again against fierce resistance, advanced a further twenty to twenty-five miles and began to swing round in a northwesterly direction. His capture of Luckau brought him within fifty miles of Berlin. Zhukov on the same day took Bernau, twelve miles north, and Alt Landsberg, fifteen miles east of Berlin. He then closed on the city and by the evening his troops were fighting in the northeastern suburbs.

On 22 April, Koniev intensified his threat to Dresden—a move which, in view of the next day’s events, seems to have aimed at setting up a defensive flank facing southwards. Zhukov extended his hold on the Berlin suburbs, opened up a new line of approach from the southeast, and began to swing a twenty-mile loop round the north of the city.

On 23 April, there came, at last, Moscow’s official announcement of the Berlin offensive. It reported a complete breakthrough from the east to a depth of forty to sixty miles, the fall of Frankfurt-on-Oder and of several more Berlin suburbs. It also recorded the capture of Oranienburg, twenty miles north-northwest of Berlin—which showed that the twenty-mile loop was swinging on.

A second announcement reported Koniev’s breakthrough in the south, the fall of Kotbus on the Spree, and a series of deep drives to the west, northwest, and north. The westerly drive reached the Elbe, the northwesterly thrust captured Beelitz, twenty-five miles southwest of Berlin, and foreshadowed the loop which was to be thrown round the capital from the south. But the deepest advance was made on the direct route to Berlin, and Koniev’s troops ended the day in the southern outskirts of the city.

Linking Up

All exterior lines strategy aims ultimately at a link-up behind the enemy’s face, but the first linking in the Battle of Berlin was not of this nature. It occurred when Koniev’s right wing joined up with Zhukov’s left somewhere southeast of Berlin. The significance of this lay in the fact that it closed the mouth of the large pocket, stretching forty-five miles from Frankfurt to Kottbus, which had been created by the converging advances of the Russian central armies. After the link-up on 24 April, the German troops left in the pocket could no longer make their way through the southeastern lake district into the capital city. The pressure at the base of the pocket was continuous. Fürstenberg on the Oder and Guben on the Neisse were captured on 24 April, and other sizable towns fell on the 25th and 26th. Those who escaped from these places only found their way into the trap where the link-up had occurred, and 54,000 of them were taken prisoner here, 27 and 29 April. When the area was finally mopped up on 2 May, the full tally of German losses amounted to 60,000 dead and 120,000 prisoners.

But greater link-ups were, meanwhile, coming to a culmination. On 24 April, Zhukov’s northern loop swung westward from Oranienburg and then southward towards Nauen, twenty-four miles west-by-north from Berlin, while Koniev skirted the lakes west of Potsdam in the direction of Ketzin. On the 25th, the two armies joined up northwest of Potsdam and Berlin was encircled.

On this day also, at 1:30 in the afternoon, occurred the historic meeting of east and west at Torgau, on the Elbe—and the end of the war was in sight. There remained only the mopping up of the streets of Berlin, and this always-difficult task was completed within the week. At 3:00 PM on 2 May, the garrison of Berlin surrendered.

Epilogue

The student of war will rejoice to find that the story of the decisive battles for Berlin makes a clear-cut and pretty pattern. This is especially noteworthy since it came
at a time when the war in other parts of Germany had degenerated into a formless jumble with British and American divisions ranging the countryside like knights errant in search of dragons to fight—and usually finding that they were reluctant dragons. Perhaps the greatest joy will be felt by the Red Army commanders whose aim has long been to prove that Russians, not Germans, are the premier exponents of the art of war on land.

But the somewhat unexpected collapse of the German western front nearly deprived the Russians of this final satisfaction. Germany might well have surrendered while the Soviet Army was still on the Oder-Neisse line.

**Artillery Reconnaissance**

Translated at the Command and General Staff School from a Russian article by Brigadier General M. Rostovtsev in *Krasnaya Zvezda* (Red Star) 3 March 1945.

The missions of artillery reconnaissance depend, naturally, on the general missions confronting the artillery during the various periods of action. When action develops in the operational depth, the artillery remains with and supports the rifle units or mobile groups. It is necessary for the artillery to have timely information concerning the nature of the enemy’s defenses in the rear areas, where his forces are concentrated and his reserves located, and concerning the direction from which and the time when counter-attacks may be expected. Consequently, artillery reconnaissance aims at the timely acquisition of these facts, and in doing so, utilizes information of the enemy obtained by units of other arms.

Aerial reconnaissance, in particular, should cover not only the battle position of the enemy but also the nearest portions of his rear areas—the second and third defense zones, centers of resistance, etc. The aerial photography should be completed in time for artillery headquarters to be provided with photographic maps two or three days before the approach to the next defense zone or before the second echelon (mobile group) is committed. This amount of time is required for familiarization with and interpretation of the photographic material for the purposes of organization of maneuvers and preparation of massed fire.

We shall consider the work of the artillery reconnaissance from the point of view of the group in which it operates.

**Reconnaissance in Accompanying Artillery**

Combat experience has shown that every accompanying gun section should have a scout whose duties are those of road and enemy reconnaissance. Otherwise, it will be difficult for the gun commander to orient himself, since his cannoners are not in a position to do any reconnaissance of their own. An accompanying gun is usually displaced by bounds of from 300 to 600 meters. The scout, having chosen a concealed approach to the next firing position, warns the gun commander of the obstacles that will be encountered on the way to it. Then, after taking his position at some point suitable for observation, he studies the enemy and reports his findings to the gun commander as the latter comes to the new position.

**Reconnaissance in Infantry Support Artillery Groups**

In preparing for action, the reconnaissance officers, knowing their zones of attack, mark tentative locations for the observation posts. Reconnaissance under these circumstances is carried out by advance mobile reconnaissance groups provided with radio equipment. When enemy resistance is especially stubborn, a complete system of observation with supplementary and flank observation posts is organized.
As soon as an attacks stalls, artillery reconnaissance promptly institutes a careful study of the enemy. Essentially, divisional and corps artillery groups deliver concentrated fire on his strongpoints and assembly areas and also prepare to lay down standing barrages in case of counterattacks. To increase the accuracy of fire, it is necessary to compare the results of aerial photography with data from other types of reconnaissance, and to identify the targets on the ground.

In mobile forms of action, when our forces are in close contact with the enemy, artillery reconnaissance must be especially active. Under such circumstances, the work of the mobile reconnaissance groups and also that of artillerymen detailed for deep infantry reconnaissance acquires great significance. Their missions are to locate the enemy’s lines of retreat, to study his activities in preparation and occupation of successive positions, to locate concentrations of reserves, to discover his preparations for counterattacks, and to request and conduct artillery fires. It is also advantageous to make use of artillery observation planes for purposes of reconnaissance, or to use fighter planes to which a definite zone of action has been assigned.

Further forward displacement of the artillery, as it is well known, is effected by echelons, in accordance with a previously prepared plan. This movement is assured by means of reconnaissance of the route, organized in the artillery regiments. It is advisable to include in the composition of the patrols men who are especially trained in the detection and neutralization of mine fields.

The reconnaissance of targets for counterbattery groups is a very difficult task. An enemy who is falling back, frequently removes a part of his artillery to a rear defense line and with the remainder covers the rear-guard action, displacing it by echelons. Sound and flash reconnaissance becomes difficult in this case because of the short duration of the period of action and the quick displacement of the artillery. In some sectors, however, where the enemy displays stubborn resistance with his fires and is holding our forces back, the deployment of sound-ranging platoons is obligatory and, at the same time, both the deployment and the methods employed in the surveying of targets must be rapid and displacement forward should be in bounds of from six to eight kilometers.

The location of enemy batteries and the conduct of artillery fire is a task that should be assumed by planes and observation balloons. It is imperative that an agreement be reached previously relative to signals and the conduct of the artillery fire. Observation balloons, held by adjustable cables, follow immediately behind the artillery. Their missions are observation of our own forces, reconnaissance of the enemy, and correction of the fire of the counterbattery group.

In recent operations, there have occurred many instances in which the skilful employment of reconnaissance means has resulted in the brilliant and successful accomplishment of operational or tactical missions. When the 14th Army Corps, for example, was making its way through the depth of the enemy’s positions, it had need of fire support for the suppression of German artillery and also for the shelling of certain river crossings. The army artillery group, which had been called into action, sent out ahead an observation balloon. With its help, five enemy batteries were located, and as soon as these were suppressed, the crossings were demolished.

Reconnaissance in Antitank Units

For artillery officers and the commanding officers of the various units, it is very important to have at their disposal information relative to concentrations of enemy tanks and sectors where particular danger from tanks exits. It is only when in possession of this information that it is possible to work out a plan for the employment of the antitank reserve. The success of its operations depends, in the main, on the speed of its deployment before the counterattacks by the enemy tanks occur. The dispatching of a plane (the fighter plane is best suited for this purpose) on visual reconnaissance and constant observation of the maneuvers of the enemy’s armored forces assure this timely deployment
of the antitank reserve at the most advantageous positions. Reconnaissance data transmitted by radio should be picked up by the staffs of both artillery and reserve.

It is usual for forward observers and "listeners" from the antitank units to operate with the advanced infantry units. Their duty is to detect in a timely manner the approach of enemy tanks and enemy preparations for counterattacks. The dispatching of reconnaissance groups by the antitank units to the enemy's flanks or rear areas is also of no little advantage. In addition to forward observation posts, it is also necessary to establish posts in the immediate vicinity of the antitank units for the purpose of warning of immediate danger.

In joint operations with tanks, at the present time, artillery reconnaissance and the conduct of artillery fire are very commonly done from armored vehicles. Most frequently, it is the commanders of the batteries or batteries of divisional and corps artillery groups who conduct fire. A tank equipped with a radio moves along behind the first lines of the advancing tanks, and it is the duty of the artilleryman riding in this tank to discover the focal points of enemy resistance and request artillery fires.

The computation of firing data in mobile warfare is accomplished, in the main, by the use of maps. In the course of the battle, however, all data are estimated. As the battle progresses, all targets and firing positions are surveyed in. Surveying for artillery battalions is done by the regimental survey platoons. Later on, army ties in all regimental surveys to enable all units to work on the same grid system.

Artillery Reconnaissance in Pursuit

Missions, types, and methods of reconnaissance are provided for by regulations, but it should be noted that under present-day conditions artillery reconnaissance will, in most instances, be accomplished by scouts in motor vehicles. Ordinarily, there is sent out from the artillery regiment (group) a patrol composed of a few reconnaissance officers (regimental and battalion), five to seven scouts, and a few radio operators.

The functions of the advance patrol and of the road patrol are, in this case, merged with one another. Particular care should be exercised in the organization of the radio communication with the patrols and of an uninterrupted flow of information.

In artillery units, including the artillery of the second echelon [literal translation], it is also necessary to organize direct reconnaissance, since, under the conditions of mobile warfare, encounters with the enemy are possible in areas already passed over by the forward units.

The advance patrols of the artillery in mobile groups operate with the advance reconnaissance of motorized and tank groups. Their missions are the same as those of the division and army artillery patrols. It is desirable that the patrols should make use of armored vehicles. All information obtained is transmitted immediately to the officer who has sent out the patrol. The patrols of tank-destroyer units should move in front of the column or on the flanks, and when no contact exists between them and the troops that follow them, some patrols should be in the rear of the column.

Mobile groups should be supplied with artillery reconnaissance planes. These are able to discover the lines on which the enemy is preparing his resistance, the approach of his reserves, and his preparations for counterattacks—all of which is necessary for the timely warning of the artillery.

When our troops approach new defense lines, it is especially necessary to make use of the data secured by operational aerial reconnaissance, both aerial and aerial photographic. If the defense line is carried on the move, these data, verified by reconnaissance on the ground and supplemented by data furnished by the advance reconnaissance, are employed in the organization of massed blows by artillery and aviation. If the carrying of the defense line assumes the form of a planned breakthrough operation, reconnaissance is effected in the same
way as in a breakthrough of the main line of defense—but within shorter time limits.

Air artillery reconnaissance in the deep rear of the enemy is carried out by the regular patrol planes operating in the sectors assigned to them as well as by the artillery planes attached to the mobile groups. The important thing in this connection is well-organized liaison between planes and artillery. For the organization of cooperation, it is expedient to assign a signal officer from the aviation regiment to the artillery units. It is no less important to provide the reconnaissance planes with advance airfields, landing strips, and the necessary supplies of fuel.

The accomplishment of worthwhile results in the organization of artillery reconnaissance in mobile forms of action calls for great application, and effort on the part of the particular sections of the staff and of the officers in charge of this task. Before the start of the action, it is necessary to brief accurately each reconnaissance agency, to set up reliable cooperation among them, and to secure an unbroken flow of information from higher to lower units. Each artillery scout must consider it his duty not only to obtain information but also to transmit it promptly to the higher headquarters and communicate it to all lower units.

**Fighting in Burma—Just Good Infantrymen**

Digested at the Command and General Staff School from an article in *Aim*, army magazine of the British Middle East Command, No. 44, June 1945.

The publicity given to the original Wingate expedition, though romantic and inspiring, left behind an exaggerated impression of the caliber of the troops who took part, and obscured some of the most important objects of the operation.

One of the tragedies of the death of Major General Wingate is that the methods he used stand the risk of being attributed to him personally as something exceptional, rather than being accepted as straightforward tactics derived from a thorough appreciation of the ground and enemy with which he was faced. By and large, the same condition will apply wherever British troops meet the Japs in close country.

The experimental 77th Indian Infantry Brigade was formed in July 1942, not to carry out a highly specialized role but to be a pattern for British infantry who would have to fight in the jungle.

The Japs knew that, owing to the nature of the country, it must be a war for infantry who could march and carry all they needed with them. They valued motor transport as a luxury only to be used when the offensive power of the enemy was destroyed. They fashioned their army to fight in Southeast Asia against an enemy trained to operate along the roads of Europe.

Field Marshal Wavell saw that the first thing British troops must do was to master the country; that infantry must be able to move miles ahead of their bases to clear the area of the enemy before the sappers could work on the roads and airfields; that the only way to supply such infantry is by air; that control must be by wireless; that if the infantry are not roadbound, heavy arms and armament cannot be deployed against them in close country.

The 77th Indian Infantry Brigade was to be the prototype. They were to move across country, to be supplied by air, to be controlled by wireless, and, most important of all, they were to be perfectly ordinary troops.

In the writer's opinion, it is a thousand pities that the term "long-range penetration" has become synonymous with the Brigade. It implies a specialist task where no specialist task exists.

The Jap advance into Manipur was a good example of a large force moving off roads taking the initiative from a larger force based on a road, and, if they had had air
superiority, it is difficult to see how Imphal could have been held.

Any decent battalion can carry out long-or short-range penetration for four or five weeks, provided they have three months' jungle training and weed out the unfit before they start.

This weeding out should be done by the company and platoon commanders and the medical officer. All ranks must be able to march long distances across country carrying fifty-six pounds, including weapons, and have enough self-respect to get on with their job without constant supervision.

Men need not be of the commando type. We found that our company clerks, runners, intelligence section, batmen, etc.—the quieter types—often had more mental stamina than their lustier brethren.

It has been stated in some quarters that the type of soldier required for the jungle is "a big-game hunter." This gives a completely wrong impression. The enemy, the Jap, is in some ways a fine soldier, in others very stupid, but his eyes and ears are no better than those of a British soldier, and he certainly cannot smell your trail. He has spent most of his life in towns or paddy fields, hundreds of miles from the tropics, and got his initial reputation as a mysteriously good jungle fighter because he used tracks and guides when we used main roads.

Our reinforcements came to us after the monsoon. We were able to teach them all we knew in three months, and physically, when we went into Burma, they were in better condition than the men of our original battalion.

They came from over thirty different regiments, and in No. 7 Column we kept men from different parts of the country and men who had come out in the same ship together. We reaped the benefit from this when conditions were hard, for our men had confidence in themselves and their column and were able to talk to each other about things they had in common.

Training is hard work and very simple. It resolves itself into getting used to operating in close country away from roads and comforts, in learning to shoot to kill at fifty yards and never to shoot unless you can kill, and generally being able to look after yourself.

The way to start is to take all motor transport away and to send the cooks, equipment repairers, bootmakers, etc., back to the rifle companies so that each company, platoon, and section is as far as possible self-contained.

We had a platoon of Burma Rifles with each column. This is much more than will be possible for ordinary battalions. It should be possible for adequate intelligence arrangements to be made for forward battalions if the supply of personnel with local knowledge is planned in advance and officers are given a little training in dealing with the kind of natives they will meet.

There are times when the battalion has to leave its jeeps behind. Our medical officers had two mules in each column, and it encouraged the men to know that something could be done for them if they were wounded. Native carriers will often be the answer, but the mule is a grand animal. The harder the expedition, the more attached to you he seems to become. We cursed ours in India, but we cherished them in Burma.

The supply of mules is limited and they cannot be produced on an assembly belt, but the troops who will need them most are the forward infantry. It is essential to get used to moving and operating with animal transport, and the mule and the mule leader have to know what is expected of them in an emergency, or else they'll halt when the first shot is fired.

Discipline must come from men having confidence in their officers. The only form of punishment that is of value is one that a man feels quickly and knows is just. The effect on the natives of seeing good discipline is tremendous. If your men are under control, the natives trust and respect you. If they trust you, they help you. Their help in getting food and information is invaluable.
Major General Wingate used to worry about our stupidity when we started. This was because none of us really understood what we were doing. One by one the factors that we were contending with sank into our minds, the object became clear, and we managed to put up a respectable show. We got a sense of proportion and realized that the monsoon at its worst was probably better than Ypres in the last war. That you stood much less chance of being killed in a jungle than you did in the more open warfare of Europe and the desert, because the aimed shot was your enemy and you were not the sport of gunners and machine-gunners and tanks.

We knew it had its grim side. The loneliness of the jungle is frightening until you get used to it and know that animals are terrified of you and that the last thing a snake wants to do is to bite you if you'll let it live in peace. The discomforts were obvious, but we found that we slept just as well on the ground as we had done in our beds, the fresh air was good for us, and much of the country was beautiful.

In fact this type of fighting is hard and exhausting, especially for the sick and wounded, and you can seldom relax, for the Jap is a relentless and unpleasant enemy, but it has a healthy and happy aspect which has been too much overlooked.

The more that is known about the war in the East, the easier it will be to sort out the real problems from the imaginary terrors.

In Southeast Asia, infantry, signallers, and sappers are by far the most important arms, and the infantry will do ninety percent of the fighting. If they are given the best available personnel and trained in the way we were trained, they will be able to do more than we did and prove far superior to the Japs.

Secret East Indies Base

From a British source.

On the convoy route to India on the small coral island, Addu Atoll, part of the Maldive group of islands about 500 miles west of Colombo, a force of Royal Marines constructed a secret naval base in the Indian Ocean in preparation for any offensive the Japanese might launch in the Far East.

The base was begun in September 1941, before the Japanese struck at Pearl Harbor. The Marines, drawn from the first mobile naval defense organization, worked against time and tropical disease to hack out of the jungle a fleet anchorage. The port was of great strategical importance, lying on the convoy routes round the Cape of Good Hope or Suez to India.

Four months after the Marines landed, the first convoy of five troopships, escorted by the cruiser HMS Emerald put in to water and fuel. Afterwards, the port was used regularly by troopships and naval vessels. In 1942 the Queen Mary stopped at the island, carrying returning Australian troops from the Middle East back to their country.

The base, which was called Fort T, was quickly built, though disease played havoc with the working troops. More than twenty-three percent had to be evacuated in the first three months. Coastal batteries, searchlights, signal towers, roads, camps, administrative buildings, and jetties were constructed, and the surrounding islands were linked together by causeways. Batteries of guns controlled the approaches.

All these difficulties were surmounted, and the base formed a vital link in the chain to the Far East and Australia.
Mobile Dockyards

Digested at the Command and General Staff School from an article by Captain Frank H. Shaw in The Navy (Great Britain) May 1945.

To construct emergency harbors on the Normandy coast in readiness for D-day was a surprising feat; but it is doubtful if the floating dockyards that accompany the U.S. Pacific fleet on their lengthy voyage do not outvie the Mulberries for daring in conception and value in use.

From the outset of the Pacific war the dockyard accommodation naturally became pressing. In aggressive warfare, U.S. ships—British, too—stood to take heavy punishment, but not all ships hit were necessarily sunk. Yet many were so hard hit as to render the task of navigating them back to bases where repairs could be effected precarious. Such a course, moreover, necessitated such

greatest problem for naval strategists has been the immense distance between Allied bases and those of the enemy. Japan made the most of such distances when she established her defensive perimeter several thousand miles away from the mainland of Nippon proper, for, having interior communications between her outposts and her mainland ports, she could fit out the distant stepping-stones adequately to keep her naval forces amply supplied with stores and munitions. But for the Allies such facilities were not available. The nearer they got to Japan's outworks the farther their own lines of communication extended. And since such lines were seaway, the problem of efficient slightly damaged vessels being out of action for longer than was necessary merely to make repairs. The answer to the problem was to bring the refitting dockyard to the scene of action; and this has been done, to the extent of creating a floating city, capable of going almost anywhere and doing almost anything.

The word "city" is no misnomer. These mobile dockyards carry a population of some 12,000 people, all of them expert craftsmen. They are like the floating dock that was in commission in Singapore before that city's capture, only they are much bigger and even better equipped. They are entirely self-contained, able to provide their own power.
for even the most important repairs; are supplied with the last word in machine tools, and can practically replate an armored ship in an incredibly short time.

The most luxurious liner ever sent afloat does not possess the ameliorations of the new conception, which owns a post office and complete postal service, shops, grand-scale bakeries, stores capable of accommodating millions of spare parts, and almost incalculable tons of steel plates, bards, ties, and all the various appurtenances of shipbuilding. The skilled personnel comprise carpenters, painters, upholsterers, electricians, doctors, and nurses, as well as a working crew, consisting of picked men, amongst whom the highly efficient navigators are not least in importance; for it has happened, and will again, that a warship has reeled out of the battle line with all her means of communication with the outside world shot away, and in no condition to inform the rescuers how best they might make contact.

Such mobile cities are adequately protected, needless to say. Apart from their own anti-aircraft defenses, they sail in company with escort carriers capable of putting up a withering blast of fire against any possible air attack. Naturally, on account of their dimensions, their speed through the water is comparatively slow, and this renders them extremely vulnerable to all types of attack, whether from the air, from under the sea, or from the sea's surface—provided the Japanese Navy has the temerity to venture so far from its bases.

Though details are not yet available, it may safely be surmised that the floating cities are so armed as to be able to beat off surface attack by even heavy enemy ships; but their defense against submarine onslaughts are left to the inevitable escort of fast destroyers and sloops and the like.

Jules Verne, even in his most inspired moments, never dreamed of such a fantastic product of man's ingenuity. His giant raft on the Amazon had within its limits many of the characteristics of a town, but only in the way of maintaining the human lives of its crew, and its defenses against hostile attack were fragmentary, designed to combat ill-armed savages only. But in the mobile dock-
yards every contingency has been foreseen and prepared for. They hold sufficient living accommodation in excess of the personnel’s needs to house the crews of the ships they are required to tend; for men, shaken in battle, cannot expect to exist aboard a shuttle vessel whilst the crash and din and discomfort of complete repair are disturbing them. There are recreational facilities, too—a theater, a cinema, a dance parlor, hairdressers’ shops; all included within a vast bulk that is capable of withstanding the most furious Pacific storms—and the Pacific can stage the worst storms known to seafaring mankind.

The reserve of buoyancy in such a construction is necessarily great. To take a cruiser of, say, 10,000 tons displacement into the dry dock, pump out the water, and expose the keel of such a considerable ship needs a very considerable excess buoyancy. But this is allowed for in the general design. The operation of dry-docking a damaged warship is conducted almost precisely at sea as it is ashore. Inevitably, the “patient” floats pretty low in the water. The dock is therefore sunk deeply, to permit its visitor to be floated over the dock-sill. This probably means that the dockyard is capable of submersion to the extent of at least thirty feet more than normal. To position the entering ship is a delicate matter. Even in a shore-based dry dock the operation is difficult; a nicety of entering direction is absolutely indispensable. If the damaged cruiser gets out of control, an infinite amount of damage might be done, both to herself and the cradle into which she is entering. Tugs naturally play a great part in this meticulous operation. As the patient’s auxiliary machinery is more than likely out of commission owing to shell or bomb damage, the floating dockyard’s capstans and winches are commissioned to haul her into position. The keel blocks have previously been sited on the dry dock’s bottom to suit the constructional needs and idiosyncrasies of the entering ship; for a vessel out of the water is subjected to strains that never affect her when she is waterborne.

Once the blocks are placed and secured, the side-shores are ranged conveniently for immediate placing. The whole dry dock is then flooded to a sufficient depth to permit the unobstructed entry of the crippled warship. To allow a thirty-foot clearance over the dock-sill, as has been said, requires a great degree of submersion on the part of the dockyard. But a spell of smooth weather is almost a sine qua non before the delicate operation is commenced.

With the ship hauled within the confines, the great caissons closing the entrance are shut, and the pumps—giant machinery capable of throwing thousands of gallons of water a minute—get to work. Divers go down to ascertain the extent of underwater damage, and send detailed descriptions of such damage to the surface for transmission to the forges and machine shops, so that patches or entire replacements can be fashioned into shape without a moment’s loss of time. It may be that several ships await attention and there is no room for wasted time.

The forges and tool shops spring into ac-
Armor-plate rollers crunch and grind, to shape four-inch or even eight-inch steel plates into the requisite mold to fit the affected part. Such a mobile dockyard even carries smelting furnaces and molding rooms, where the raw ingot can be melted and shaped into the desired shape and size.

Meantime, the hurt ship settles gingerly on the keel blocks at the bottom of the dock, and the side-shores are placed and wedged home so that no motion of the dock can un-settle the great hull or even throw it off the blocks. It may well happen that the divers report a faulty placing of these blocks, which means that the whole operation has to be repeated—the cruiser floated out into the open sea after flooding, an adjustment, a re-entry. And all of this with the possibility of a screaming typhoon raging down on the vast construction!

Once the dock is dry and drained, work proceeds precisely as in a dockyard ashore. The armor plates are slotted and shaped and bored for rivets and bolts—though welding is playing an increasingly important part in ship repair—and they are fitted as nicely as a suit is fitted to the intended wearer.

Meantime, other working gangs get busy with the deck and interior repairs. And so, what arrives as a mangled mass of wreckage emerges at the appointed time as an efficient fighting unit, sleek in a new coat of paint and as sound as the day of her original launching. During the period of repairs a half-dozen enemy attacks may have been beaten off. For it may be stated as a fact that a wily and desperate enemy will spare no effort to immobilize or entirely destroy such an invaluable accessory to a fighting fleet.

What the Germans Thought of Their Armored Arm

Translated and digested at the Command and General Staff School from a Spanish article by Major Joaquin de la Cruz Lacaec (Infantry) in Ejército (Spain) May 1945.

What is said in the following lines is not said with the view of enunciating a doctrine or of intimating that the Panzer-waffe was in possession of the true and orthodox doctrine of the employment of tanks. We attempt only to describe as faithfully as possible the way in which the German commands regarded this matter, coordinating herein concepts gleaned from German regulations and official publications.

The dogmatic tone that will be perceived in this article reveals its origin very clearly to anyone familiar with the sober, emphatic style of German military literature.

The fire power of the armored arm, its mobility, its armor, and the ability of the various separate units to react simultaneously to the voice of command as transmitted by radio, endow it with great capacity for attack. It is able to surprise the enemy on the field of battle and to concentrate all its enormous power in one place. It is able to penetrate deeply into the enemy’s positions, disorganize his defenses, and, in the end, annihilate him.

The success of armored units has its basis in the fact that their elements go into action in compact formation and that the concentration of armor applies its efforts with utmost vigor in the enemy’s most vulnerable spot or in the place where it will be the most advantageous to crush him. For this reason it is regarded as a fundamental law that armor should never be scattered but, rather, employed in concentrated formations.

The principal mission of armored forces is to obtain the decision in the battle. On this account, the main mass of armor must always belong to the large armored unit, its employment in other units—the cavalry
division, for example—being exceptional. Also, the reinforced armored division is able to fulfill missions of greater scope independently and on its own initiative, such as surprise seizure of large areas of ground, attacks on poorly defended forces, daring penetration (armored wedges) into the depth of the enemy’s position, exploitation of success by means of attacks on the enemy’s flanks and rear, and the destruction, harrying, and pursuit of enemy armored units.

Armor is not so successful when employed against units with a strong defensive organization, since the numerous antitank obstacles and bunkers, by imposing on it a slow rate of movement, deprive it of one of its main characteristics, which is its speed. Moreover, emplaced antitank guns, antitank ditches, dragon’s teeth, etc., put a large number of units out of action, occasioning the disappearance of still another important characteristic, namely, mass.

If tanks are charged with defense missions, these will always be fulfilled in the form of counterattacks. They should not be employed for defense purposes in other than exceptional cases and never in a linear formation as so many gun emplacements, but concentrated in the rear for use in a counterattack at whatever time the command deems it necessary. In a unit of the armored arm itself, there is no danger of any such incorrect employment, but where the tanks operate with other forces, misuse of them is common, whether through ignorance or egotism—though there may exist no wrong intentions whatsoever in what is done.

During withdrawals, in breaking contact with the enemy, armored units were very successful in hiding these movements and in giving time—even to the point of sacrificing themselves—in order that other forces might be able to reorganize themselves farther to the rear and to prepare new lines.

In the armored division, it is the mission of the superior command to make use of all the other arms in the support of its armor. The infantry or the tank grenadiers will assume the burden of the combat in terrain unsuited to the employment of armor, or will clean the enemy from the areas which may still be held by him after the tanks have passed. The artillery will cooperate in the normal manner, and its groups of assault guns will lay down their fire on the enemy artillery which because of its particular location has escaped the action of our own batteries. The armored engineers with their armored vehicles will assume charge of demolitions and the construction of crossings, protected by the grenadiers and their own tanks. The antitank group will collaborate in frontal attacks and will protect the flanks from possible action by enemy tanks. The highly mobile reconnaissance group, though with armor considerably weaker than that of the tanks, will conduct tactical reconnaissance. It will also engage in action on the establishment of contact in order to provide a basis for estimating the enemy’s situation and will withdraw before serious action has started, for in the meantime the armor will have prepared itself for action. During the attack it will remain concentrated in the rear of the first echelon in order that the command, having it at all times at their finger tips, may be able to carry out whatever missions are necessary.

We see, therefore, that, contrary to what many persons believe, armor is not used for the purpose of supporting or assisting the other arms. It is the latter that are to lend their support to the greatest possible extent to the armor. Only in thus conceiving their employment is it possible to expect complete success in the exploitation of their infinite and undreamed-of possibilities which no other arm is able to equal of itself.

The Command

We have already seen that there still exists a certain amount of confusion with regard to the employment of the armored arm, a circumstance which obliges its command and, above all, the commanding officers of armored regiments to possess military virtues of the highest order and great gifts in the way of tact and judgement. High-ranking officers, nearly all of whom have been trained in the ranks of the glorious infantry, some-
times get into difficulties by involuntarily handling tanks as if they were dealing with infantry. A good infantry officer is far on his way to becoming a great tank commander, but he will never be able to surpass the man who reaches the same position after having been a lieutenant and captain in the armored forces.

It must be borne in mind that since this is a new arm, it is in a state of constant evolution, and this is true also with regard to the tactics and the technical aspect of the arm. Consequently, the commander must be the possessor of extraordinary adaptive ability, there being no place in the ranks of the armored arm for the stickler for routine. In more general terms, the person who is given to routine practices to an extreme degree or who attaches excessive importance to the matters which are common to all types of arms and services only conceals behind this cloak of activity his ignorance or incompetence in armor.

The great mobility of these units necessitates certain qualities on the part of their commanders. These are: great energy in making decisions, courage in solving the problem at hand, and a quick, firm, and clear mind that will enable him at a given moment to issue a correct order.

The peculiarities of tank combat make it imperative that the commander remain as far forward as possible, directing his units from the head of the formation. Only from this location will he be able to observe, without loss of time, any rapid change that may occur in the situation and adopt the necessary countermeasures.

The commander of an armored unit must always bear in mind the fact that his regiment, with the high degree of mobility it possesses, the protection it enjoys by virtue of its armor, the great number and power of its weapons, and the moral effect of all these factors on the enemy, is able to reach the enemy's lines in nearly full strength.

Just as we have seen that the commander in the armored arm must be specially trained, the same can also be said of the officers under his command. Their first obligation is to possess a detailed knowledge of the equipment of which they are in charge. If they do not have this detailed knowledge, they will never know what effort they can demand of their tanks. They will not be able to judge whether an objective can or cannot be attained with the means at their disposal.

In addition to this, the officer must possess the mind of the sportsman. The tank will be to him what the horse is to the rider, what the plane is to the aviator, and what the bicycle is to the cyclist. That is to say, it constitutes the habitual means he employs in his activities. By its help, he will manage always to be in good physical condition, to be at his best in his work, and to acquire the necessary prestige in the eyes of his men. Obstacle and other races and competitions between officers should be promoted in the various regiments in order that there may exist a stimulus and a zeal for excelling.

Lastly, it will be his moral mission to exercise among his companions of the other arms a constant apostolic activity in order to diffuse the true doctrine of tanks, dissipating the confusion that exists relative to the employment of the armored arm, creating an interest in it, and carrying on a true program of conversion to it. That is to say, he becomes a real missionary in the cause of his specialty.

Enlisted Personnel

To be able to carry out difficult missions, there must be careful selection in the matter of the enlisted personnel. It has been repeated to the point of satiety that the factor man is a basic one and of capital importance in armies, and the armored arm is no exception in this respect.

Tank personnel should possess the following characteristics:

1. They must be strong physically in order to be able to suffer, without diminution of their combat ability, all the discomforts associated with their work and to bear with fortitude the constant fatigue to which they are exposed.
2. They must possess moral strength. The tankman must have nerves of steel and a heart proof against all sorts of emotions. Men whose emotions are easily aroused or men who are excessively sentimental would, in most cases, find themselves in situations that were psychologically prejudicial and surcharged with moral hazards. This does not mean that the tankman must be hardened or devoid of sensibilities, but simply that he must be able to take control of and master his own feelings during the time of his service in the tank.

3. They must have training and intelligence that is not below the average. It is quite obvious that every man is not capable of being a tankman. It is not only the driver who must possess technical training well supplemented by a knowledge of mechanics, nor is it the radio operator alone who must possess special knowledge and be versed in matters as complex as those of electricity and radio. We have also the personnel who while handling the weapons must also be able to operate the turret with such important mechanisms as auxiliary motors and the various aiming instruments with their scales, verniers, mils, etc.

The Arakan Campaign of 1944

Digested at the Command and General Staff School from an article in *SEAC Souvenir*, the Services’ newspaper of the Southeast Asia Command (British).

In Burma, by January 1944, the Japs had consolidated their grip up to the perimeter of their '42 and '43 conquests. The Jap High Command decided to carry the war into India, and to break up the base where powerful armies and air and sea fleets were building up for the coming Allied general assault on Japan.

The Allies, meanwhile, suffered a change of plans. Before Teheran, these had included immediate amphibious operations somewhere in Southeast Asia, but at that conference Southeast Asia Command’s landing craft were allocated in European waters and, as the Supreme Commander has disclosed, were actually employed to force the Anzio bridgehead. Accepting this severe deprivation, Lord Louis Mountbatten still resolved to place the most aggressive interpretation on the instruction to “defend the frontiers.” The Fourteenth Army Commander, Lieutenant General Sir William Slim, was ordered to clear the Akyab peninsula as far south as possible so as to command the mouth of the River Naff for sea supply and secure the Maungdaw-Buthidaung road. The available troops were the XV Indian Corps, commanded by Lieutenant General Sir Philip Christison.

A glance at the map shows how the Arakan campaign of 1944 was dominated by the outstanding feature known as the Mayu Range. This range physically split the front; the plan of the enemy was to use it tactically to split the army which occupied it. A captured enemy Order of the Day signed by Colonel Tanahashi says of it: “The Mayu Range is a fortress given us by Heaven, to furnish us with defenses, obstructions, and concealments, with water, with quarters, with supplies of building materials unlimited. Indeed a thing of immense value. Its mountains and rivers will shortly become an unforgettable new battleground.”

East of the Mayu Range lies the Kalapanzin Valley. Bearing in mind the lesson of the Arakan campaign of 1943 (when the Japs struck up this valley, crossed the range, and fell upon the line of communications of our troops attacking Akyab along the coastal belt), General Slim proposed to advance not only down the Kalapanzin as well as the coastal belt but also to throw out a further flank screen in the distant valley beyond the next mass of hills, namely, the Kaladan Valley. The 81st West African Division was assigned this important task. It not only guarded the
Kaladan but its presence there compelled the enemy to divert troops towards it, which he urgently needed for his plan to invade India.

To link the two main forces in the coastal belt and Kalapanzin Valley, it was necessary to make something more than the trails which ran through the passes of the Mayu Range. There were two, the Goppe Pass, a mule track, and that other more famous Ngakyedauk Pass, then unfit even for mules. Ngakyedauk has since entered into the immortality of soldiers' language as the "Okeydoke."

The sappers and miners of the 7th Indian Division, equipped with bulldozers and pneumatic drills, graded its slopes, widened its rock ledges, and smoothed out its elbow bends, making the pack-road capable of bearing the armor, guns, and supply columns of an invading army.

As the engineers and road-builders reached the banks of the Kalapanzin River, the dusty
battalions of British and Indian infantry, followed by long columns of motor transport, began threading their way up to the steep slopes at the western entrance. Corps Commander Christison was building up his two-fisted attack.

His plan was to force the enemy to fight on as broad a front as possible. He had the 5th Indian Division west of the range and the 7th Indian Division east of it. They shared the crest, which, running parallel as it does to the British main line of communications from north to south, was the axis of advance. Pressing equally all along the front, XV Corps now began their steady forward movement. They had to fight hard, and learned to match their cunning against the enemy's before they came up against his main positions. These covered the fifteen-mile Maungdaw-Buthidaung road which tunnels the Mayu Ridge and provides the third great artery between one side of the mountain and the other. The tunnel area was especially strongly fortified.

Maungdaw fell to the British on 8 January, but Razabil was a harder nut. This is a natural fortress in the foothills between the Mayu Range and the sea, commanding the road. Bombers of the Strategic Air Force from the newly-created and integrated Eastern Air Command pounded this bastion with concentrated weight, medium artillery shelled it, and "General Lee" tanks, deployed for the first time in Arakan, lent their support. Much of the fortress area fell and Jap casualties were considerable, but the central position held. The Corps Commander decided to switch the main weight of his assault to Buthidaung in the Kalapanzin sector, while maintaining strong local attacks on Razabil. He was able to do this with comparative ease because his foresight had provided him with that invaluable lateral communication, "Okeydoke" Pass.

But somebody else had plans. Enter Lieutenant General Hanaya, Jap Commander in the Arakan. He proposed to invade India, and had a meticulously worked-out timetable for that design. The British pressure on his front now compelled him to accelerate his movements. In charge of his striking force he placed Colonel Tanahashi, victor of Arakan, 1943. The Jap plan was both to break up the British-Indian advance and to split the entire front, sealing off the eastern half not only from its western partner but from its own line of communications. The seizure of "Okeydoke" would achieve both these objects. On the night of 3-4 February, Tanahashi struck.

Flooding over Taung Bazar by a thirty-mile forced march, the Japs swept on to the heights of the Mayu Range north of the so-called 7th Division Admin Box* at Sinzweya. This had a few days earlier become a corps administrative area supplying the 7th Division, a brigade of the 5th Division (who were the link between the two sectors of the front), and a large number of corps troops, including a couple of artillery regiments, ack-ack and antitank batteries, and the tank unit. There were thus encamped there nearly 8,000 administrative troops, pioneers, sappers, signalers, ordnance and medical units, mule companies, and native road builders, together with a considerable amount of equipment. Protection was organized to resist any interference up to a large-scale raid. What now struck the Admin area, however, was a tornado of six thousand men. A further four thousand formed an outer ring.

A few hours before dawn on 6 February the Japs attacked the 7th Division headquarters. Fresh parties kept coming in for several days, and throughout this period a soldiers' battle raged. Signalers, sappers, cooks, clerks, all seized the rifle and fought like veteran infantry. Gradually the enemy was halted, though not before he had practiced appalling atrocities against our wounded. Tanahashi pressed on round the flank and rear, towards the Goppe Pass. He did not, in fact, reach Goppe; a little short of it he ran into the 18th Mule Company, who stood their ground resolutely and engaged him. Tanahashi, believing that Goppe Pass must

* "Admin": abbreviation for "administrative.
* "Box": defense zone set up by encircled troops.
be strongly held, and urgent to capture Bawli Bazar (XV Corps headquarters) and cut the Bawli-Maungdaw road, decided to storm straight over the 2,000-foot range between Goppe and “Okeydoke.” He burst through a large concentration of British rear echelons on the western slopes of the Mayu where he was again fiercely challenged. But, driving on with barbaric energy, he reached the road, where he blew up bridges, set fire to dumps, waylaid convoys, and finally dug in in the nearby jungle from where he kept traffic under continual fire. In the end, his raiders had to be liquidated to the last man.

The Japs’ success in interfering with our line of communications was less than they had hoped, for much of the supply of the troops on the western side of the Mayu continued to pour in by sea.

However, Tanahashi scored when he detached a force to double back along the crest of the range to cut “Okeydoke” Pass, linking up with another Jap column which had pushed through from the southeast. The wedge had been driven between the 5th Division and the 7th Division, and the latter’s supply route severed.

It really appeared to the Japanese that everything was in the bag, and so it was. Unfortunately for Tanahashi the neck of the bag was still open.

He had forgotten the air.

Through the air would pour the stores and supplies which were denied land passage. The troops thus “trapped,” instead of yielding their ground, ditching their equipment, and seeking to escape across the hills, would hold fast and hold on with sheer guts, certain that within measurable time the power would be brought them to drive the enemy from his encircling lines.

The air was filled with dogfights. Ten days after their first challenge the Jap fighters broke it off. Thereafter, the Allied fighters flew in close support, solitary strafing, or reconnaissance as they pleased and practically unimpeded. During the height of the aerial battle the huge and mostly defenseless aircraft of Troop Carrier Command flew between the sky fights and the roof of the jungle to deliver vital stores of war to the troops fighting it out in the savage hand-to-hand battles on the ground.

The job grew. By night as well as by day the supply aircraft rose from the Allied airfields. The crews simply turned their aircraft around and flew again. They slept barely five hours in the twenty-four. The ground crews serviced them, the RIASC [Royal Indian Army Service Corps] supplied them, all around the clock.

Five hundred sorties carried 1,500 tons into battle. The huge twin-engined aircraft were sitting birds for enemy fighters and ground fire. But only one was lost, and she, too, delivered her goods. In such circumstances, “encirclement” becomes a technical phrase.

Arakan, indeed, carried forward logically and demonstrated in the fire of battle the soundness of that revolutionary technique of land-air war.

Night was the cover the Japs sought to work under; darkness was their chief ally. Regularly as the sun fell over the range these subhumans donned yet more hideous face-masks and came slithering through the rank grass, whining weird animal calls to keep touch with each other.

By day the Japs were less formidable. One suicide squad came in against a post in traditional Imperial sacrifice style. Within two minutes only one remained alive, and he was too terror-stricken to move. They displayed the usual Japanese lack of resilience.

But the time for the counterstroke was now at hand, and Tanahashi’s troops were tiring. Ten days had been set for their task, and ten days’ rations issued for it. They had carried out the plan - and the British had not fled, had not even withdrawn anywhere, from the Admin Box, from their forward positions in Kalapanzin Valley, or from their line on the western side of the range.

On the contrary, the British were fighting back with growing violence, and had reoccupied Taung Bazar; what was worse, fresh troops were coming from the north. This was not in Honorable Operations Orders, either.
The forward brigades of the 7th Division had stood firm the whole of the time and inflicted heavy casualties on the enemy as well as denied him opportunity to supply his assault troops or return southwards with casualties.

Like the troops in the Admin Box, these front-line forces were also supplied entirely by air. One brigade constructed an airstrip on the banks of the Kalapanzin from which wounded were flown out of the battle area.

General Christison’s plan to complete the destruction of Tanahashi’s enterprise fell into two parts. Phase I was to clear the main Allied line of communications (the Bawli-Maungdaw road). Phase II was to clear “Okeydoke” and crush the now thoroughly mauled Jap striking force to pieces against the anvil of the intact British positions in the Kalapanzin Valley. The hammer was Major General Lomax’s “Tiger-heads” (26th Division) now advancing from Chittagong. Indeed, within a very short time of the original “encirclement” the advance elements of this force were already at grips with the most northerly force of the enemy.

The “Tiger-heads” broke all resistance along the road, destroying or driving the invaders back over the crest of Mayu Range into the Kalapanzin Valley. A battalion of the 18th Royal Garhwal Rifles were the first to arrive, and they took post at the western end of “Okeydoke” to block any further Jap irruption onto the 5th Division’s positions. They played a notable part in the final clearing of the pass in the last battle at Point 1070. Meanwhile, the 8th Gurkhas and a battalion of the 16th Punjabis steadily swept the spine of the range clean of Japs, killing scores and herding the remainder down into the Kalapanzin for dispatch there by troops defending the Admin Box.

For this purpose General Lomax had been laboriously building up his forces in the valley. His only line of communications was the Goppe mule track. But in due course both his own 26th Division and also the 36th Indian Division were fully mustered for the final settlement. The Japs generally were in a wretched state by this time. The defenders of the Admin Box had taken savage toll of them—a preliminary count revealed that more than 1,100 had been buried in this area alone. Two forward brigades of the 7th Division which, with a brigade of the 5th Division, had never relinquished their positions and had also already exacted their price, now blocked the retreat of the enemy.

Trapped themselves now, and with no transport planes to feed and munition them, the Japanese began to suffer the full pains of siege. Heavy bombers dived on their bunkers and fighters gunned their foxholes. When the planes went home for fresh bomb loads, the artillerymen relieved them, and when they in turn paused, the tank gunners opened up. The diary of a Japanese Intelligence Officer which fell into our hands recorded that Tanahashi’s Brigade Group had gone seven days without rations and had existed on wild yams and water.

The British attack was pressed home relentlessly by a pincer movement from both sides of the range.

The three weeks’ siege was raised. The breaking of the enemy’s stranglehold on “Okeydoke” was followed shortly after by the capture of Hill 1070. It required ten days’ fighting with tank and artillery support to liquidate the deep Jap bunkers in this knife-edge feature with its conical peak. Then at last the convoys loaded with food rolled once more down the slopes of “Okeydoke” to the relieved army. The Battle of Arakan was virtually over, and the Fourteenth Army stood triumphant on its first great battlefield.

They had smashed No. 1 Japanese invasion of India. Even more vital, the British and Indian soldier had set up a man-to-man superiority over the Japanese soldier in the field.
Fighting in Enemy Rear Areas
Translated and digested at the Command and General Staff School from a Russian article by Colonel V. Derman in Krasnaia Zvezda (Red Star) 19 January 1945.

FOLLOWING the breakthrough of the fortified zone, our troops are confronted with further combat missions which are characterized by rapidly developing events. These events call for bold decisions and flexible maneuvering.

The attacker may pursue the remnants of the defeated enemy units, liquidate the encircled troops, or strive to occupy advantageous positions in order to prevent the arrival of fresh hostile reinforcements. At times the pursuit assumes the form of a meeting engagement.

Instructive in this respect is the maneuver which was carried out by a large mobile unit under the command of General Boldin during the offensive in White Russia.

Having broken through several fortified zones, some units of General Boldin’s force were rushing to the rear areas while others were wiping out an encircled enemy group. The ring of encirclement around the German troops was not evenly strong everywhere, and isolated German groups succeeded in breaking out and fleeing westward. They were falling under the blows of our advance elements, and their remnants took cover in the woods. There were no defensive lines in the rear areas, but our troops knew that the enemy was taking steps to restore the disrupted front. He was bringing up fresh reinforcements for this purpose.

In this situation, General Boldin decided to form a strong mobile group composed of a motorized rifle battalion, three tank destroyer regiments, several tank units (twenty-seven vehicles), nineteen self-propelled guns, a rocket-launcher unit, and a sapper company. General Tiurin was to command the group.

The mission of the group was to rout the approaching enemy reserves and to occupy some important terrain features. In addition, it was to clear the roads of enemy rearguards and prevent disorganized German units from consolidating new positions following their disengagement from our troops.

The advance was long and difficult. Suffice it to say that the group had to cover about 200 kilometers. The country was traversed by dozens of rivers, and most of the bridges, with rare exceptions, were destroyed. There were also other difficulties. The mobile group had been formed in the course of the advance, and neither the men nor the officers had been trained for this mission.

The continually changing situation and the fact that the group operated far away from the main forces called for reliable means of communication. The group was directed by planes and radio. Since the main purpose was to gain time, the mobile group eluded engagements with small enemy units remaining on the flanks and boldly moved forward.

At Belitsa, the bridge across the Neman River was blown up, and the opposite bank was held by two German infantry battalions reinforced by assault guns. The group commander decided to destroy the enemy by a single powerful blow. In order to increase the effectiveness of its fire, almost all the artillery units of the group occupied firing positions for direct firing. Bushes and hills helped to conceal the movement of the artillery. Because of a thorough preliminary reconnaissance and of the massed fires, the enemy covering force was routed, and our infantry crossed the river.

This episode stresses the role of heavy matériel of the mobile group. Heavy weapons increase the breakthrough power of infantry and, at the same time, hamper its maneuverability, especially in close terrain with numerous rivers.

Officers with initiative will increase the mobility of such mobile groups by using extensively various local crossing materials or by going around the rivers. In the given case, the mobile group faced a very large
river, and the crossing had to be carried out in a different manner. The group commander had to deviate from the main route of advance and cross approximately twenty kilometers to the southwest where ferries were available. In the meantime the infantry, which had already crossed the river, was to keep on fighting, without support, the remnants of the enemy and proceed westward by forced marches.

Each ferry trip took more than thirty minutes, but by using truck winches the speed of the ferries was increased six times. When the crossing was completed and the artillery had joined the infantry, the group resumed its advance and, with furious engagements flaring up at various points, fought its way to the west.

Forty kilometers from the crossing point, the commander received alarming news from his reconnaissance: our troops had captured an enemy battery and prisoners belonging to a new German division which had obviously been brought up from another sector of the front. This information clarified to some extent the plan of the German command. It was learned that this division had been ordered to defend the bank of the river which was now approximately forty-five kilometers behind the mobile group. The enemy was moving along several roads, while our group used only one road or direction.

It was now necessary either to establish a hasty defense or to disrupt once more the enemy battle formations on a narrow front. The commander chose the second alternative. The main purpose was to move ahead and secure the maneuver of the main force left behind.

Soon the advance guard of the mobile group engaged superior enemy forces and shifted to defense. At the same time, other units of the group were attacked from the rear. With the Germans pressing from two opposite sides, the column of our troops was somewhat compressed. The contraction of its depth, was compensated by increasing its radius of action in the direction of both flanks. The group established an all-around defense.

At dusk the enemy became more active. The mobile group was attacked from all sides, and first of all from the east, i.e. from the direction where our troops were expected to appear. Between the mobile group and the main force, there was now concentrated a considerable number of German troops attempting to advance westward. The mobile group was running short of fuel and ammunition. No bullets and shells were wasted. The enemy was allowed to approach as close as possible before fire was opened. Even rocket launchers, despite all the rules, conducted single-shot aimed fire. Whenever an artillery battery was knocked out of action, it was replaced by another battery either from an adjacent or opposite sector of the front. Heaps of dead Germans were piled up in front of each gun.

In the very heat of the battle one of our officers personally drove a tank into attack with only three shells left for the tank gun. At the same time, an order was issued to start the motors of the rocket-launcher trucks. The Germans retired. We found out later that they had been fooled by the noise of the motors and had mistaken our parked trucks for tanks emerging from the woods.

The furious battle raged all night. There was no contact between the mobile group and the main force since all our radios were destroyed. Nevertheless, help was given the group where it was most needed by the artillery of the main force which fired simultaneously on the enemy troops operating between the mobile group and the main force and on the enemy units attacking from the west.

At 0900 General Boldin's main force joined the mobile group. As a result of the battle the remnants of several German divisions retiring to the west were completely destroyed, and the fresh 50th Division, which had attempted to restore the front, was routed. The mobile group took about a thousand prisoners, several guns, and many vehicles.

In deep thrusts into enemy defenses, prerequisites are created for a rapid penetration of mobile groups into the gap. These
groups, taking advantage of the relatively low saturation with troops of enemy rear areas, possess wide freedom of action and are able to paralyze the enemy reserves and to destroy enemy rear guards, screening forces, and remnants of the defeated units. They also secure the rapid advance of the main force.

The experience gained in the employment of mobile groups shows that these should be formed in advance, i.e., before the breakthrough. Care should be taken that the mission of the infantry component is not limited to the mere defense of the attached artillery and other fire means. In other words, the strength of the infantry element should be increased. Otherwise, the mobile group may lose its independence.

This brief description of the dynamics of the battle shows that on many occasions the appearance of the enemy was unexpected. Of course, it is difficult to exclude the element of chance from the extremely changeable conditions under which the mobile groups have to operate. However, if observation of the area in front of and on the flanks of the unit is carefully conducted, it is not difficult to detect the enemy in time. Reconnaissance units must be provided with light tanks and motorcycles. When the mobile group operates at a considerable distance from the main force (which happens frequently), it is advisable to provide it with liaison planes. It is also worth mentioning that in addition to other radio sets there should also be a special radio for the air force liaison officer.

It goes without saying that the mobile group operating in an area traversed by numerous rivers should be provided with crossing equipment.

One of the most acute problems is fuel supply. It cannot be solved simply by an increase in the number of fuel tanks. In combat, fuel tanks may be damaged. This happened once to one of our mobile groups, immobilizing the motors and leading to the disruption of the whole operation.

Experience shows that planes can be used for delivery of fuel. This is probably the most reliable method, inasmuch as remnants of the defeated enemy units always try to disrupt traffic on the roads connecting the mobile groups with the main force.

The combat experience of General Tiurin's mobile group is very instructive. This method of maneuvering may be employed in any season, particularly in winter time. It should be remembered that mobile groups operate in difficult and sometimes uncertain situations. Bravery of officers, daring combat spirit, wide initiative in making decisions, and persistence in the accomplishment of the assigned mission secure the success of the most complex maneuver in the enemy rear.

Battle is the final objective of armies, and man is the fundamental instrument in battle. Nothing can wisely be prescribed in an army—its personnel, organization, discipline, and tactics, things which are connected like fingers of a hand—without exact knowledge of the fundamental instrument, man, and his state of mind, his morale, at the instant of combat. Man is flesh and blood; he is body and soul. And strong as the soul often is, it cannot dominate the body to the point where there will not be a revolt of the flesh and mental perturbation in the face of destruction. The best masters are those who know man best, the man of today and the man of history.

—Ardant du Picq in *The Relation of Psychology to Leadership* by Helmick
Soviet versus German Tanks
Digested at the Command and General Staff School from an article by
Colonel Peter Rybakov in The Tank (Great Britain) April 1945.

The Nazi Command until the end of 1942 organized and equipped their tank forces on principles based upon their blitzkrieg plans. Their tactics were worked out for a swift, continuous advance without regard to the resistance power of their opponents.

According to German military doctrines, tanks were, in the main, to go into action alone, unsupported by infantry. Infantry and artillery were to serve as auxiliaries, to consolidate tank successes, and to mop up remaining pockets of resistance.

When the Germans launched their Polish campaign, seventy percent of their panzers were small and light tanks of the Mark I and II models, and thirty percent medium Mark III and IV tanks. Their most common panzer then was a light II with thin armor and light guns.

When they attacked the Soviet Union, thirty-five percent of their panzers were light and sixty-five percent medium tanks. These, too, had relatively thin armor and carried small ordnance. The Mark III had a 37-mm gun to a 75-mm short-barrel cannon with far from satisfactory ballistic qualities. The frontal armor of these tanks did not exceed a thickness of fifty millimeters.

Having sustained heavy tank losses in 1941 and 1942, the Nazis replaced all light machines and the medium Mark III by Panther Mark V's and Tiger Mark VI's. By 1943 about eighty percent of the German machines consisted of medium tanks and twenty percent heavy tanks. The armor-piercing force of their cannon was increased three- to fourfold, and the thickness of their frontal armor doubled. The principal tank of the
The German army then became the medium IV with a long-barrel 75-mm cannon.

The German Command's incorrect appraisal of the role of tanks in war and the superiority of the Soviet machines cost the Nazis 70,000 tanks crippled and destroyed in three years of war. The Red army in the same period lost 49,000 tanks.

Their fighting and mobile qualities place Soviet tanks among the best that modern tank technics can give. Their principle qualities are: high degree of mobility, ability to negotiate all kinds of terrain, high power of their cannon and machine guns, and reliable armor. Soviet tanks, too, can carry a greater supply of fuel than the Germans.

Operations of Soviet and German tanks in the Ukraine during the spring thaw of 1944 may serve as an illustration. German tanks had frequently to be abandoned as they were stranded in the mud, whereas Soviet tanks continued successfully in action. Pushing through roadless terrain, they penetrated to the depths of the German defenses, severed enemy communications, seized rail and highway junctions, and cut off the retreat of the Nazis. Unleashing fresh blows in the depth of the enemy's defenses, Soviet tanks decimated the German tanks and then, together with the infantry attacking artillery from the front, surrounded and annihilated them.

The famous Soviet medium tank, T34, mounting a high-velocity gun. The tank has a speed of approximately thirty-five miles per hour, is heavily armored, and is very maneuverable. (Sovfoto)

The cannon of the Soviet medium T-34 can pierce the armor of a Panther or Tiger at a considerable distance. The Red Army's heavy tanks are superior to the Panthers and Tigers, both in the power of their fire and the armor-piercing force of their shells. The turret of the heavy German Tiger VI moves at a speed of one rotation per minute and this to a certain extent must hamper fire maneuver. The armor of a heavy Soviet tank is superior to the German panzers both in thickness and quality. True, the Germans
have frequently increased the thickness of their armor by special side and frontal shields on turrets. This, however, has affected their mobility, since the power of their motors is unchanged and their weight is greatly increased by the shields.

Red Army tank specialists have carried out certain tests on Soviet and German tanks to compare the strength of their armor. Both machines were tested under identical conditions. It turned out that the armor of the German machines could be pierced completely by a certain shell, whereas Soviet tanks were pierced only eighty percent with the same caliber. Moreover, when the shell penetrated the German armor, the latter split or fractured. The armor of the Soviet tanks, on the other hand, neither fractured nor split.

Another advantage Soviet tanks enjoy is that they are fueled with Diesel oil, whereas the German machines require high-grade benzine. Tanks operating on high-grade benzine are more easily set ablaze.

Commitment of the Second Echelon of a Division

Translated and digested at the Command and General Staff School from a Russian article by Major B. Glebov in Krasnaja Zvezda (Red Star) 11 April 1945.

In many cases, in an attack on a previously prepared position, our infantry divisions are formed in two, and at times three, echelons. In each instance, the need for this echelonment and its degree are determined by the situation and mission. Nevertheless, whatever the conditions, the basic requirement is that the echelon formation of the attacking force shall not impair the breaching power of the first echelon.

In the echelonment of battle formations at the time of an attack, a certain number of the infantry weapons of the division are inactive. But as large a proportion of the heavy weapons of the second echelon (artillery, mortars, heavy machine guns) as possible should be used for the support of the first echelon. It is necessary to organize this in advance and in such a manner that the fire means taken from the second echelon will be employed with the greatest effectiveness and promptly returned to the units of the second echelon.

In echeloning battle formations, it is necessary to take carefully into account when, at what terrain lines, with what missions, and with the support of what artillery means it is proposed to send the second echelon into action. Possibly it will be expedient to work out some variants, but all of them must conform to the basic purpose of echelon-
increased resistance. During this time, the advance elements of the third regiment composing the second echelon were moving ahead, cleaning the German groups which had escaped destruction out of the trenches that had been seized. The main body of the regiment kept at a distance of one and a half to two kilometers from the line of the front—since the terrain was open and could be observed by the enemy. When the attack on the third trench began, the commander of the division sent the entire regiment into the fight in order to guarantee a breakthrough of the German position in its entire depth.

Let us turn to another example. A rifle division, using two rifle regiments in its first echelon, had broken through two lines of trenches and was successfully continuing the fight in the rear areas, repelling enemy counterattacks and mopping up enemy strongpoints. Because of the fact that the defense possessed considerable depth, and the extremely broken terrain impeded the advance of the attacking forces, the fighting continued for two whole days. The second echelon was committed only on the second day. Up to this time, it had been but a kilometer from the first echelon.

In many cases, the second echelon of a division is committed while the first echelon is fulfilling its primary mission. But at times the situation requires a different decision. The N-th Rifle Division, attacking on a three-kilometer front, with its battle formation in two echelons, was faced with the task of breaking through previously prepared enemy positions. After breaking through the German positions, the regiments of the first echelon at once went over to pursuit. They repelled enemy counterattacks and by-passed pockets of resistance. As a matter of fact, the regiment composing the second echelon was not sent into action at that time. Only a few units of it were engaged in clearing a few remaining enemy strongpoints scattered in the forest.

Finally, the attacking forces approached a previously prepared line on which the Germans were displaying strong resistance. And it was at this time that the second echelon of the division, moving at a distance of from one and a half to two kilometers behind the line of the front, was quickly deployed and moved out from behind the flank of the regiment making the main attack. After a short struggle, the enemy was overcome and began hurriedly to withdraw.

Thus, in the given instance, it proved advantageous to commit the second echelon after the position had been broken through over its entire depth. This is to be explained primarily by the rapid tempo at which the breakthrough had been effected.

In this example, all the units of the second echelon of the division were sent into action at the same time. But this is not always the case. One can cite many instances where the second echelon was committed a unit at a time, the commitment of each unit resulting from a distinct situation. The operations of the "X" Rifle Division are instructive. It was ordered to break through a powerful enemy line on a two-kilometer front. Difficulties began to develop owing to the fact that it was necessary to seize possession of an inhabited place, which was strongly fortified and located between two hills, used by the enemy for delivering crossfires on our advancing units.

The two regiments of the first echelon had seized one trench and by the close of the day had forced their way into the inhabited place. Here a second trench was located. In addition to this, the enemy was making heavy use of stone structures for the protection of his weapons. The commander of the division, having estimated the situation, decided that it would be necessary to reinforce the first echelon in order to insure a breakthrough. To effect this, one rifle battalion of the second echelon regiment was moved up ahead during the night. After the density of the battle formation of the first echelon had been increased, the latter took its position in the area assigned to it and entrenched itself. At night, the weapons for direct firing were brought up. The enemy was constantly under action of the artillery.
and mortar fire, and the battalion suffered no casualties as it went into action.

At dawn, after artillery and aerial preparation, the division began the attack. One of the units seized the second trench, and the others began to clean out the Germans from one house after another. The enemy, driven out of the inhabited place, attempted to consolidate himself in the outskirts of the village. It was at that moment that the commander of the division committed the other two battalions remaining in the second echelon of the division. Out of sight of the enemy, they advanced to the line of the second echelon and deployed out from behind the flank of the above-mentioned battalion. Having effected a turning movement (which is facilitated by the echeloned structure of the battle formation), the second echelon assisted in quickly knocking out the enemy, in broadening the breach, and in effecting a breakthrough of the entire depth of the defensive position. Soon an army tank group moved into the breach.

Thus, in the cited case, one battalion of the second echelon regiment was sent into action during the night before the attack, for the reinforcement of the first echelon and the intensification of the blow in the sector where the most stubborn enemy resistance existed. The remaining units of the second echelon were committed at the crucial moment of the fight for the exploitation of the success attained by the division. Having fulfilled the mission, the second echelon together with the other regiments pursued the enemy.

Since each attack arises, as a rule, out of circumstances that are never exactly duplicated, the experiences of war provide a multitude of the most diverse examples of the commitment of the second echelon. Let us pause to examine another example which is characterized by the fact that the breakthrough of the enemy's defense was combined with the forcing of a water barrier.

The German positions extended along the bank of the river. The rifle pits and the discontinuous trenches of the enemy began at a distance of 200 meters from the river. Many communication trenches led to the rear. Small inhabited places and separate farms located in the rear of his defense had been fortified and protected by trenches. The Germans attached great importance to this natural line of defense and had concentrated considerable reserves.

On the basis of an estimate of the situation, the commander of the division formed his units in two echelons. The main attack was delivered in the center by the adjacent flank units of the two regiments which constituted the first echelon. At night, small groups composed of men drawn from these regiments stealthily crossed the river and established a bridgehead. In the morning, with the support of artillery and mortar fire, the first echelons of both regiments forced their way across the river and attacked the German positions. In the main, the second echelons of the regiments and of the division remained on the west bank of the river in the trenches, since the bridgehead did not permit of their deployment. It was necessary also to take into account the fact that the enemy had burned off the brush on his side of the river. A premature crossing by a considerable force would have led to excessive casualties under the existing circumstances.

By the end of the first hour, the units attacking on the enemy's side of the river had effected a considerable advance. The Germans held a woods to their rear, out of which they continued to counterattack. To clean the Germans out of the woods and to widen the bridgehead, the second echelons of the regiments were now committed. When they had fulfilled this mission, the second echelon of the division also crossed to the east bank. But it did not go into action at this time.

The enemy displayed particularly stubborn resistance in the vicinity of a hill which was important from a tactical point of view. He undertook frequent counterattacks with his reserve. The tempo of our attack decreased. By the close of the day, we had not yet taken the hill. Then the commander decided, by
means of a night attack, to destroy the enemy reserve which was concentrated in the vicinity of the hill, and assigned this mission to the second echelon of the division.

As soon as it became dark, however, the situation underwent a decided change. Our reconnaissance units discovered that the Germans were beginning to withdraw their forces. The commander, who was in contact with them, then made a new decision. The main body, including all the second echelon, was sent in a northeasterly direction in order to cut the highway over which the enemy was withdrawing, while a portion of the division continued to operate energetically against the enemy front in order to cover the proposed maneuver and to prevent the Germans from withdrawing.

The examples we have presented show how important it is correctly to determine the necessity for and the degree of echelonment of the battle formation of a division, and also the importance of the opportune employment of the second or succeeding echelons.

The choice of the form of combat formation is a most important element in the tactical conception. It influences, to an enormous extent, the development of the action. That is why, in making the decision to echelon attacking forces, it is necessary to consider all the peculiarities of the situation.

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**RAF Bomber Command and the Ruhr**

Digested at the Command and General Staff School from an article in *The Fighting Forces* (Great Britain) June 1945.

The Ruhr is, or rather was, the greatest center of heavy industry and coal mining in Europe, and without it it is improbable that the Germans would ever have been able to attempt to conquer Europe. The area has consistently remained Germany's main arsenal, providing not only innumerable finished products but also the raw materials for other industries all over the country. The deposits of coal and iron ore are the richest in Europe and on these are absolutely dependent the steel works, armament works, synthetic oil plants, and chemical factories of which there are great numbers throughout the Ruhr and which cannot work economically except in the neighborhood of their main raw materials. The Ruhr, it is estimated, could produce as much steel as the whole of England and half the coal.

This enormous concentration of industries in a comparatively small area near Germany's western frontier proved extremely vulnerable to air attack from Britain, but the Germans did not originally think that this would be the case and there was some reason for their opinion. The factories made their own smoke screen, which was never absent and which even on a bright moonlight night made it almost impossible to distinguish landmarks from the air; haze in the low-lying river valley gave further concealment.

There was certainly a huge concentration of industry in the area, but the word "concentration" would give a misleading impression if it suggested that buildings were thick on the ground and that any bomb dropped within the area of the Ruhr was likely to destroy something worth hitting. There are only three clearly defined central city areas in the Rhur proper—in the centers of Duisburg, Essen, and Dortmund—and even the inner residential areas are not usually fully built up. The suburban or semi-urban areas are the most characteristic features of the districts, and the semi-urban areas cover the greater part of the Ruhr which is not open country. They consist of houses with large gardens, wide streets, and open spaces. Bombing had therefore to be very accurate.

Finally, as a further protection, the enemy had in and around the Ruhr the greatest concentration of antiaircraft defenses in Germany. There were, for example, about a thousand heavy and about a thousand light
antiaircraft guns in the area, as compared with about 800 antiaircraft guns in and around Berlin, and there were many night-fighter bases both inside and within easy range of the Ruhr.

It is therefore not surprising that the Ruhr, though regarded as RAF Bomber Command's first priority target from the beginning of the war, was not heavily damaged until 1943. The first Battle of the Ruhr may be regarded as beginning on the night of 5 March 1943, when Bomber Command first did serious damage to Krupps and Essen, in the heart of the Ruhr. This battle was at its height during May and June 1943, but attacks on industrial towns in the Ruhr continued at intervals until the end of the year, and in the spring of 1944 return attacks were made on several of the most important targets, such as Essen and Dortmund, to destroy what had been repaired and to impede reconstruction. Then, in the autumn of 1944, Bomber Command began its Second Battle of the Ruhr—very different in aim, tactics, and general character from the first. This second battle began on the night of 6 October with a heavy attack on Dortmund, and all the main industrial and railway centers of the Ruhr were attacked in turn within the next few months, some of them several times over.

The aim of this second battle was as much tactical as strategic. The Allied armies were now fighting within a few miles of the Ruhr, and the vast network of communications by rail, road, and water in the district were proving of the greatest value to the dying German Army. It was impossible, as in France, to attack only key points in so large and intricate a system of communication where there was always an alternative route for one temporarily out of action. The aim was to block the railways and disorganize the whole district. But a further problem was that this inevitably meant bombing areas already heavily devastated. Attacks of unprecedented weight were therefore carried out, often of about 4,000 tons at a time, and one against Duisburg of nearly ten thousand tons in twenty-four hours. Because fire would not spread in largely devastated areas, the bomb load usually consisted almost entirely of high explosives. The attack on the transportation system of the Ruhr had the double aim of cutting lines of communication to the battlefield and preventing the enemy from getting coal and steel out of the Ruhr to industries farther east. It is known that in fact coal piled up in the Ruhr while there was a fuel shortage almost everywhere in Germany. Stocks of steel in the Ruhr actually mounted at a time when the Ruhr's output of steel had been reduced to a small fraction of what it was before, and this was simply because the steel could not be got out of the district.

A second aim of this Second Battle of the Ruhr was the destruction of what war industries remained. These had now become of added importance to the enemy because they were so near to the battle. Benzol went straight from the Ruhr into the petrol tanks of Rundstedt's armor during his offensive.

Between the beginning of the war and the end of March 1945, RAF Bomber Command dropped 121,360 tons of bombs on the fourteen principal towns of the Ruhr and of the neighboring valley of the Wupper. The two river valleys form a single economic and industrial whole, and no other industrial area in Germany, or anywhere else in the world, has been so heavily and continuously bombed. The figure of more than 120,000 tons of bombs dropped on the fourteen main towns of this area does not include the bombs dropped, either by the RAF or by the U.S. AAF, in attacks on individual factories or railway targets.

The fourteen towns are Bochum, Dortmund, Duisburg, Düsseldorf, Essen, Gelsenkirchen, Hagen, Mulheim, Oberhausen, Remscheid, Solingen, Witten, Wuppertal-Barmen, and Wuppertal-Elberfeld. Their combined populations were 4,115,000.

In most instances the main area of destruction is found in the business and administrative centers of these fourteen towns, and therefore in areas which are mostly seventy percent or more built up. The effect should be much the same as at Coventry, though on a vastly greater scale. As compared to Coventry, between fifty and sixty percent
of its corresponding German town, Wuppertal-Barmen, was devastated even before the latest Bomber Command attack last March, which caused further heavy damage.

Out of Germany's whole supply of coking coal the Ruhr produced at the peak of its wartime activity seventy-one percent, and as a result the same district produced sixty-one and a half percent of the enemy's total supply of pig iron and steel. Perhaps even more important, two-thirds of the enemy's high-grade alloy steels came from the Ruhr, and these steels are absolutely indispensable for the production of a large range of armaments, including aero-engines; even more than ordinary steel, high-grade steel requires good coking coal for its production.

Because of the presence of all these steel works in the Ruhr, the enemy's two largest armament and engineering works—and also the two largest in Europe—were in the same area. These were Krupps of Essen and Rheinmetall Borsig of Düsseldorf. From the coal in the Ruhr derived the oil produced in the ten synthetic oil plants in the district, all of which were constantly attacked by Bomber Command. These ten plants produced one-third of all Germany's supplies of synthetic oil, or eleven percent of the enemy's whole supply of oil at a time when the Germans enjoyed the use of the oil fields of Rumania, Poland, and Hungary. The coking plants of the Ruhr produced benzol motor fuel as a byproduct, and these, when fully working, produced sixty-four percent of all the enemy's supplies of benzol. It is significant of the importance of this source of production that after many steel plants were out of action and, in consequence, there was no great demand for coking coal, the enemy still kept the huge coking plants of the Ruhr fully active, and continued to repair them after they had been frequently bombed, for the sake of the benzol they produced.

Until the spring of 1943 and the full development of Pathfinder tactics, the industrial haze over these crowded industrial areas very efficiently protected them and led to the wastage of a considerable number of bombs in attacks on them. But from March 1943 onwards there was no further check and objectives in the Ruhr were readily attacked in good and bad weather, in daylight as well as by night, and by precision as well as by area bombing. By the summer of 1944 the whole area was completely at the mercy of
the Allied air forces, and during the Allied armies' advance across Germany we began to get solid information about the results of these two years of bombing; many facts are now coming in from official German sources, from captured documents and interviews with Germans in key positions in the war industry. These facts fully confirm the estimates of the results of bombing the Ruhr which were previously made from interpretation of air photographs.

The general conclusion is, as was always expected, that the cumulative effect of bombing is what matters. Until March of 1943, the output of iron and steel in the Ruhr was steady, and then, it is now learned, there was a slight drop, probably the result of the attacks on Essen, a town which is far more important for the production of finished armaments and engineering products than of iron and steel. In May 1943, when the first Battle of the Ruhr was reaching its height and Bomber Command dropped more than 9,000 tons on objectives in this area, there was a sharp drop of twenty percent in the output of pig iron, crude steel, and rolled steel. This was a serious loss; it meant, for example, a loss of 300,000 tons of crude steel a month. During the rest of the year the output of iron and steel went slightly up and down, but in general the average loss was at the rate of fifteen percent of the total output per month. In some key centers of the steel industry, losses were much higher. In Bochum, of vital importance as the main center for the production of high-grade alloy steel, the great Bochumer Verein Trust lost on the average of fifty percent per month of its former output per month. At Remscheid, almost obliterated in a single attack on the night of 30 July 1943, a special high-grade steel plant produced nothing at all for two months.

Attacks on the Ruhr continued throughout 1944 and in the last three months of that year Bomber Command carried out a whole series of attacks of unprecedented weight, often dropping between 4,000 and 5,000 tons of bombs in single attacks on the main industrial towns of this area. The effect of such cumulative bombing over two years was startling. When the output of occupied territories was also taken from the enemy, the effect was enormous. The Vereinigte Stahlwerke, whose collieries and works produced twenty percent of the Ruhr coal and coke and fifty percent of the Ruhr iron and steel, lost between September 1944 and February 1945 nearly forty-eight percent of its average output during the previous year, from September 1943 to September 1944. There would, of course, have been a still greater loss of output if the situation at the end of 1944 and beginning of 1945 had been compared with some period before the beginning of the Battle of the Ruhr. A comparison of the output of coke, pig iron, and steel during the same two periods in 1943-44 and 1944-45 shows an even more startling loss; in the later period the percentage decrease of coke was fifty-seven percent, of pig iron seventy percent, and of steel seventy-four percent.

Perhaps even more significant are facts which have come to light about the effect of loss of production in the Ruhr on industries outside that area. Steel production in the Siegerland southeast of the Ruhr, an area seldom attacked by Bomber Command, fell by sixty-two percent during the ten months between March 1944 and December 1944.

In war, everything is co-related. Every move has some reason, seeks some object; once that object is determined it decides the nature and importance of the means to be employed.

—Foch
The British Navy's Part in Victory

Digested at the Command and General Staff School from an article in The Fleet (Great Britain) June 1945.

The overwhelming Allied defeat of Nazi Germany, as was the similar defeat of Fascist Italy nearly two years ago, was the result of the successful integration of the Fighting Services and the Mercantile Marine, but there is no question that, as an island nation with a large Empire scattered overseas, the foundation of Allied success was sea power, provided for the first two and a half years mainly by the British Navy and for the last three years jointly by the British and American Navies.

Moreover, it was superior sea power that made possible all our military campaigns, which initially were all seaborne, and, with the Merchant Navy carrying and the Royal Navy convoying, ensured that the Army was landed at the right place at the right time, and afterwards their reinforcements and supplies guaranteed.

The second great European war is notable, from the naval point of view, for two important facts: (1) there was no great sea action similar to the Battle of Jutland with the German Fleet in the last war, though certain important surface-ship encounters occurred, albeit with lengthy intervals, and (2) there was a continuous Nazi U-boat campaign from the first day of the war till the last—mainly against merchant ships.

The first capital-ship encounter occurred in July 1940 and, unfortunately, was between British ships and those of our late ally, the French. After France capitulated, friendly negotiations failed to provide an honorable disposition of their warships in North Africa and, perforce, they had to be put out of action to prevent them being made use of by the Germans. This was done by capital-ship gunfire and aircraft attack.

In that month also occurred the first encounter with Italian surface ships, a cruiser engagement in which the Australian cruiser Sydney sank the enemy cruiser Bartolomeo Colleoni in the Mediterranean.

Four months elapsed and then, in November 1940, the Fleet Air Arm gave the first demonstration of a successful aircraft attack on a fleet in harbor which declined to go to sea to engage its opponents. Half of Mussolini's battle fleet of six ships were put out of action, which transferred the balance of power to the British Mediterranean Fleet, at a time when it was sorely needed.

The only naval battle of the war in Europe in any way resembling a fleet action between the British Fleet and either the German or Italian Fleet was the Battle of Cape Matapan, in March 1941, when three Italian cruisers and three destroyers were sunk by our Mediterranean Fleet, without damage to our ships or a single casualty.

Two months later came the one and only
real British and German capital-ship encounter, when the Nazi battleship *Bismarck* broke out into the Atlantic and sank the battle-cruiser *Hood*, only herself to be sunk three days later while trying to seek the shelter of an occupied French port.

At the end of 1941, with the Japanese entry into the war, began our serious naval losses in the Far East, but these are outside the purview of this article.

The year 1942 brought only two encounters with enemy surface ships: (1) the aircraft and destroyer attack on the three German ships, *Scharnhorst*, *Gneisenau*, and *Prinz Eugen* during their heller-skelter dash up the Channel from Brest to Germany, and (2) the feeble attempt of an Italian force to attack a British convoy in the Mediterranean, when the battleship *Littorio* and two other enemy ships were damaged.

Similarly, during 1943 the larger units of the two enemy fleets were singularly inactive until, in September, the first full results of British sea power were realized with the surrender of the Italian Fleet. This notable event greatly changed the whole balance of sea power in Europe to the advantage of the Allies.

Then, before the year was out, came the Home Fleet success in the sinking of the Nazi battle-cruiser *Scharnhorst* off the North Cape, during one of her few sorties to attack a North Russian convoy. This was followed a few days later by the success of our two cruisers against seven destroyers in the Bay of Biscay.

The year 1944 and the first five months of this year produced no surface-ship engagements with the main units of the German Navy, most of which had already been sunk or seriously damaged, often by RAF aircraft when the ships were in harbor—in particular, the sinking of the only Nazi battleship, the *Tirpitz*. In fact, the German war at sea largely deteriorated to the use of only small ships in coastal waters, and even there the British craft and their crews were superior to the enemy.

The Navy's main effort, however, throughout nearly six years of war has been to defeat the unrestricted U-boat campaign which, if successful, might well have caused first our defeat at sea and then complete disaster. It was essential that our convoys should be kept running to guarantee in sufficient volume the feeding of Great Britain; the supplies for our factories, munitions of war, and the movement of our troops and reinforcements. This stupendous task was achieved, despite the heavy odds, by the gallantry of the Mercantile Marine and the intrepidity of the Royal Navy, with the success which is apparent in the magnitude of the defeat of our European enemies.

Another important feature of the Navy's task and success was in its support of military operations. The original transfer of the British Army and its supplies to France, in 1939, passed almost unheralded. But the "little ships" epic evacuation of over 330,000 of the Army from Dunkirk will be remembered for all time.

Our main military effort had then to be concentrated against the Italians in Libya which, eventually, meant for the Merchant Navy and Royal Navy the "long haul" round the Cape of 12,000 miles to Egypt. Two years of persistent overseas effort was necessary before Rommel was got "on the run" at Alamein and, at the same time, the first great British and American amphibious descent was made on the coast of North Africa.

The greatest amphibious operation of all time was staged on the Normandy coast, and during the eleven months from D-day to VE-day the Navy supported the Army in every way possible and contributed in no small measure to the Army's spectacular success. All told, the Navy's task, and that of the Mercantile Marine, has been colossal and, in the final analysis, the success has been that of the crews—officers and men.