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Active Fronts

AUGUST, 1943

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IN THIS ISSUE we present with pride some of the finest accounts of combat that have come out of this war. Material of this type is the most valuable thing we can print, the most useful for any artilleryman regardless of grade or experience.

Maj. Stong's article is the first of a series covering operations of the artillery with the 9th Division in Tunisia. Others will follow monthly.

We ask the cooperation of all artillerymen, especially those in higher headquarters, in making such accounts available for the benefit of all concerned. Carbons of reports or narrative accounts are entirely acceptable. All overseas material is carefully edited here for security purposes, and properly cleared through the War Department before publication, so you will undoubtedly receive ample local cooperation and readily obtain the permission of your immediate superiors for such carbons to be mailed. If that should be withheld your own writings will be equally welcome, whether you are an operations sergeant or corps artillery officer.

IN OUR APRIL ISSUE was detailed a battle-proven convergence chart, the "Sands Graph." Unfortunately an error crept into the description. On page 309, second column, the sentence beginning on line 16 should read "So as not to affect the elevation, a *plus* site is needed . . ."

The July JOURNAL had its moments, too. Col. A. Lhomme, former Director and Chief of the Research Department of the Arsenal de Puteaux and now Chief of the Military Section of the French Military Mission in Washington, justly retains his pride in France's famous arsenal. He points out that the 47-mm AT gun is not a Schneider product, but rather "was invented, studied, and realized by the Atelier de Construction de Puteaux, Arsenal of State," which has many fine weapons to its credit.

Pictured at the bottom of page 501 is a piece of Italian 75-mm support artillery. It is the 75/18 gun (Ansaldo) on the M13 medium Ansaldo tank. The Italians call it the Semovante.

SOMETIMES special devices best solve special situations, as Lt. Smith suggests herein. It is actually a matter of balance: combat calls for a *minimum* of the simplest equipment *compatible with the job* (read Capt. Raymond last month, Capt. Casey in this issue).

Despite some suggestions to the contrary, shipping space *is* scarce. As Capt. Gray said in April, "all we could load on board was what could be tied to the gun." Also, you'll find no spare transportation when you debark.

Thought for today: take what is essential, but *don't be a pack-rat, don't be a hoarder*.

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"Today's Field Artillery Journal is tomorrow's Training Regulations."

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Type of map used by forward observers, showing typical terrain. Dotted line approximates front lines prior to our final drive which started January 10, 1943. The firing batteries were on the east side of the Matanikau two and three thousand yards to the rear of the line.

AN ARTILLERY FORWARD OBSERVER on GUADALCANAL

Capt. Casey's vivid account of operations on Guadalcanal ranks well up with the best battle literature. It is direct, to the point, and wholly authentic. During the Guadalcanal campaign Capt. Casey commanded Battery C, ——th FA Bn; most of the last two months of fighting he spent in the front lines as a forward observer, and adjusted between fifteen and twenty thousand rounds of artillery fire.

By Capt. John F. Casey, Jr., FA

The campaign of Guadalcanal ended some weeks ago. It was a small and costly battle as campaigns go, far more costly for the enemy than for ourselves. It received more than its share of publicity since it was the first front on which American troops took the offensive. But its name will not live long in American history: this shady land of cocoanut palms will be forgotten in the welter of splendid victories to come. And yet, the lessons of the campaign will affect our conduct of military and naval affairs in the extermination of Tojo's little yellow men. Field artillery will profit greatly from its experiences.

In the campaign from December 21, 1942, to February 9, 1943, Marine mobile 75-mm pack howitzers and Army 105s proved the most effective artillery weapons for this type of terrain. The ground west of the Matanikau River is marked by steep grassy ridges and deep jungle draws (see photomap). Our troops, having air superiority, elected to run the ridges. The enemy clung to reverse slopes in deep jungle gullies. In most instances, they had tunnelled extensive dugouts fortified by hardy cocoanut logs.

Which type of fuze and projectile would cause the most damage under the circumstances? Shell HE with delay fuze could not penetrate the depth of the jungle. Time fire merely scarred the 300-foot trees, and its side and tail spray were spent before they cut through the tangle of parasitical vines. Shell HE, Fuze M48 fired with high angle fire was found most effective in the early stages.

Before our attack began, harassing fires were placed at dawn and at dusk on the draws where patrols found opposition. It was felt, with some justification, that the Japs would leave their dugouts to worship and to eat during these periods. Intermittent fires smashed through the night, deep on the coastal supply road and on well-worn interior trails. Daylight firing was limited because of the danger of hitting our own patrols.

Air reconnaissance was unsatisfactory in interior areas. Even aerial photos failed to show some of the Japs' well-hidden installations. As the lines advanced it became apparent that the enemy had no greater love for the treacherous wooded peaks to the south than ourselves. Their CP and heavy artillery positions straddled the road from Point Cruz to the Bonagi River. One mud-gutted stretch in Kokumbona was alive with General Staff CPs, well camouflaged but poorly dispersed.

Artillery guns and howitzers were rarely found in battery formation, but rather as single sentinels along the flanks of the road. Stream beds and banks were particularly popular sites for bivouac areas. All wooded draws in the line of advance were hot-beds of mortar, machine gun, and sniper activity. Most of the time this activity was not visible until patrols or advance elements of our point were enveloped.

The old maxims of placement of artillery fires held true against the Japs. Roads, thick draws, likely OPs, and stream beds are fair meat for our artillery even though little or no enemy activity can be actually observed. What firing was done on these areas was singularly effective.

High angle fire with the 105s was an interesting experiment. None of the battalions on Guadalcanal had tried it on the range. There was no particular reference to it in any field manuals. The basic idea behind its use was to flush the Japs who clung to the reverse slopes of open ridges. The trajectory of the shell fired at normal elevation was too flat. With a more gradual angle of fall there was considerable dead space where fire was most needed. Moreover, it was felt that greater dispersion would result from the high angle of fall.

In general the fire had the desired effect, but it was somewhat erratic. It was not dependable enough for use close to our own front lines. Shorts landing among our own troops are unpleasant at best and none of us had any desire to experiment. We finally discontinued high angle fire within 400 yards of our own lines.

It is obvious that only two methods were available for conducting fire: airplane spotting and forward observation. The latter method was by far the most popular and produced the best results. Forward observers carrying infantry packs and 3-day C and D rations accompanied the assault company or companies of each infantry battalion. They kept in communication with FDC by SCR-194 and -511. They also laid liaison wire wherever they were, keeping pace with the advance.

The forward observing we mention here was full of ramifications not considered in the books. The field of observation was often limited by mammoth trees which towered in front of our lines. Sometimes, especially on the west bank of the Matanikau River, the ridges increase in height as you go west so that the observer could only see the draw to his immediate front. It was usually necessary to pull fires within 100 yards of our line. This type of adjustment can not be done safely from rear or lateral OPs. Occasionally we adjusted fire at night when it was impossible to see even a flash in the target area.

The problems of a dismounted artillery forward observer under unforeseen conditions were quickly solved. The observers and their teams were a familiar and welcome addition to each infantry battalion and assault company. We learned to travel light and quietly. Circumstances quickly taught us minor infantry tactics. We drank out of shell holes. We went days without chow. The honeymoon was over; the artillery went to war.

My first experience as a forward observer under battle conditions may best illustrate some of the problems. On December 21, 1942, the 1st and 3rd Battalions of the ——nd Infantry were ordered to take Grassy Knoll (Mt. Austin or Hill 31), then push south and secure Hill 27 (Exhibit B). This accomplished, the enemy would be forced out of observation and artillery range of Henderson Field. The advance started as scheduled and Hills 30 and 31 were taken without much resistance. However, when the battalions attempted to penetrate the jungle ravines to the south in the direction of Hill 27, they met heavy machine gun and sniper fire. Japs firing from heavily fortified pill boxes held almost impregnable positions (see Exhibit A).

It was therefore decided to send the 2nd Battalion on a two-day march, circling to the east and to the south and capturing the hill from the rear. At that time the number of Japs involved was undetermined. Maps and prisoners captured at a later date proved that the enemy had a reinforced infantry brigade concentrated in this area. The enemy planned to secure Hill 27 on the afternoon of January 2nd, sweep north to drive our troops from Grassy Knoll, and then push toward Henderson Field. It was nip and tuck for a while but we beat them to the punch.

The 3rd Battalion, 10th Marines (75-mm pack howitzers, commanded by Lt. Col. Manly L. Curry) were in direct support of the doughboy regiment. The ——th FA Bn, commanded by Lt. Col. Robert E. Moffett, was to provide 105-mm reinforcing fires. Marine Capt. Hitt, a veteran of several battles on Savo and Guadalcanal, was combination liaison officer and forward observer with the 2nd Bn. An instrument sergeant, a radio operator, two wire men, and I went along for the experience. There was also some talk that we might take over direct support when Hill 27 was secured.

The first two-day march was uneventful. It was made over extremely rugged terrain in the heat of the day. It took 4½ miles of liaison wire to cover a 1,000-yard map distance. Fortunately, native carriers brought water in to us each afternoon.

On the evening of January 1st we were in position in a tiny draw southeast of Hill 27 and about 700 yards airline distance from the objective. Telephone communications to the rear were still good, so the radio silence was continued. Lt. Col. Ferry, Bn CO, issued orders that we would be on our way at 0530. The battalion CP would remain in its present location until the hill was taken and would then move up. Because of the disposition of our troops and patrols it would be impossible to use artillery after the initial prearranged preparation. Capt. Hitt was to remain with the colonel, and I was to take the wire team and the radio and jump off with the assault company.

Col. Alexander George, regimental CO, added a light note to the evening when he called to wish us all luck and say he'd meet us on 27 at noon the next day with a bottle of Scotch. There was an air of quiet confidence about the men; this was their first action, but they were well trained and disciplined. Most important, they had implicit belief in their leaders.

By 0530 the first platoon of E Company was on the way, my artillery team right on their tail with the company commander. The battalion was to advance in column of companies, single file, to the bottom of Hill 27. At this point they were to deploy to as great an extent as the terrain would permit and take the Hill—E Company on the left, F Company on the right, G and Heavy Weapons in reserve.

At 0630 we lay panting on a wooded ridge as the artillery opened up with everything they had. The deafening ker-boom of 155s, the sharp crack of 75s, and the bur-r-r-oom of 105s reverberated through the shady gullies. For the doughboys it was their baptism of fire. They hugged the ground wonderingly as spent fragments whizzed all around. A slow drawl of easy banter passed up and down the lines. One of my boys was kidding the doughboys into complacency. The tension eased.

At seven o'clock the barrage lifted and we were on our way again. By this time the heat was stifling. Our soaked combat suits clung oppressively to our hides. Perspiration coursed in streams, cutting swaths through our camouflage blacking. Going down hill was as tiring and hazardous as the climb. Half crawling, half sliding, clinging to vines, we made our way along the slick trail.

There was no noise now, no chattering or bantering, nothing but the chirping of birds and the light crunch of feet. Off to our right and far above us the form of a bald burned hill began to take shape through the foliage. Word came back along the line for me to go up forward. The platoon leader and the company commander were off to the side reporting in.

"Is that 27?"

"Yes." I was sure. It couldn't be anything else.

We plunged down into another ravine and then started our toughest climb. Enemy fire lanes criss-crossed our ascent but no whiz of bullets broke the silence. Word came back, man to man, "Lt. Giesal's on the hill. The 1st Platoon is taking up positions on the left and is digging in. No opposition."

We passed several recently vacated machine gun dugouts. It looked as though we had completely surprised them. On and up we went until we finally broke through to the artillery-pocked summit. Crouching behind a natural stone wall, we watched the companies swarm over the hill and commence digging.

There had been no firing other than sporadic rounds from

the enemy snipers. It looked like a cinch. The impregnable 27 had been taken without our infantry firing a round. The boys were jubilant and a little cocky. Machine guns were brought up and placed on the flanks. F Company was tieing into E's right flank. One platoon was crawling, still cautious, to the peak of the hill and over another natural rocky formation at the summit (position "C" on Exhibit A).

Then all hell broke loose. Machine guns and rifles pinged from all directions. Snipers fired from trees within our own CP. Cross fire cut down our boys who were over the hill. Cries for corpsmen and stretcher bearers were passed back. Our Garands answered the fire and the battle was on. Enemy "knee mortars" popped on our lines with painful regularity. Our own 60s opened up and neutralized them, only to have the shells start lobbing in from a different direction. Orders were barked and carried out. The men were puzzled but game. It was the old story of trying to draw a bead on an unseen foe. We called in and told FDC the situation and asked for fire. However, our own patrols were still in the way.

About 1600 Capt. Hitt received word that he could adjust his outfit on the stone wall at the crest of the hill. He decided to pull it over into the draw to the northwest. We tugged our line to a convenient shell hole and started adjusting.

"Battery G, one round smoke. Right 500, Hill 27," etc.

In order to observe better, Capt. Hitt crawled out on a ledge in front of the doughboys. I pulled the phone out as far as it would go and hit the deck to relay commands.

"Left 100, Down 100, Shell HE, Battery 1 rd."

Bur-r-r-r-r-boom. "Record adjusted data, George; give me Hypo"—and so it went.

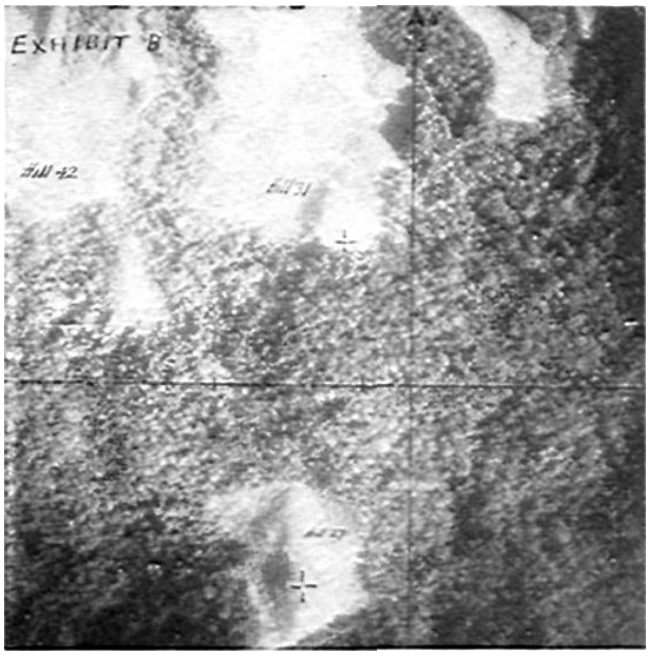
Hitt's plan was to adjust battalion concentrations on all vulnerable sides of the hill. As we came back to our shell-hole a mortar got our range. One over, one short—that one was really close—one right, one left—all tossing rocks and fragments over us. The battle had opened up again with increased fury. In a short lull we started down the hill, running low and zig-zagging, attempting to take advantage of the curve in the ridge. Hitt was loping along about five yards in front of me when the .25 MG opened up. Spurts of dust danced at our feet. Hitt's hand went up; the Japs had put one clean through his right shoulder.

He had a lot of guts, that man. I rushed to help him but he sent me scurrying to inform his "Old Man" of the accident, and slid down the steep hill unaided. His part in the battle was over. It was too near dark to get another Marine observer in and, moreover, it was doubtful if the supply line was still open. It was up to me.

My experience with conduct of fire by forward observation was extremely limited. We had done plenty of dry firing on miniature ranges. However, in two years of army and four years of reserve training, I had only fired about five FO problems, all in the last week before we came up here and all on fairly simple terrain. I had fired my share of precision, axial, small- and large-angle T, and a bit of bracket. I had fired several 'plane problems—but Forward Observer Methods in tough terrain with the battalion firing directly at me, No! Furthermore I would have to use Marine methods: give commands in yards instead of sensings. Col. Curry called me up from FDC and told me the situation was all in my hands and that they would cooperate 100%—a swell gesture.

Hitt had adjusted to the northwest, Concentration 941. From this I could shift to the north side of the hill if necessary, but adjustment here was still impossible since the location of the other battalions was not definitely known. I could also pull 941 down to the draw to the south, to protect our left flank. I decided to use the remaining moments of light to adjust on the draws to the south and southwest of the hill in an attempt to prevent a complete encirclement that night.

It did not take long to discover that smoke shell was erratic. (This later proved true of 105 smoke also.) It was next to impossible to see flashes of HE in the dusky draws. Finally we picked up a flash, and George was set. Hypo and Inter followed, adjusted shoulder to shoulder in the draw so that the whole concentration one *c* up and one *c* down covered the complete draw as it curved from southwest to south.



This photo gives some idea of the terrain around Hill 27. The jungle growth between the open hills is full of deep gullies and steep wooded ridges.

While I was adjusting, my back to the front line, men rushed to reinforce the wall. The Japs were making another bayonet attack. The infantry was having its troubles and was expecting a heavy attack sometime during the night. The 1st and 3rd Battalions were still unable to advance, and were 700 yards north on Grassy Knoll. The Japs were in force to the north, northwest, and west of the hill. Some firing from the southwest, south, and southeast showed that an undetermined number had infiltrated into these regions. To all intents and purposes we were surrounded, except for a small draw to the east—not a comforting outlook with darkness falling.

I went to my foxhole just to the lee of the wall and called FDC. I arranged to have harassing fires placed on concentration 941 and 942 one *c* up and one *c* down every hour during the night. We also agreed that if there were any exceptional need for these or any fires they would stand ready to get them out as soon as I called.

Blackness had blanketed the hill with a cloak of ominous silence. Only the inevitable wildlife chirped and croaked unperturbed.

Suddenly the whisper came along the line, "Get Capt. Casey up to the wall right away." As I climbed up the hill I stumbled over exhausted forms and muttered the password as sort of an endless chant. Soon I reached the middle of the line and Lt. Giesal's CP. The situation was not pleasant. The doughboys had withdrawn to the low line of ragged rock (position "F" on Exhibit A) which we had used as a CP in the morning, leaving the ridge open above them. A gap had developed between E and F Companies, and Lt. Giesal was begging for more men to fill it. Orders had been given to the grimy, blood-stained, sleep-sodden doughboys that there would be no firing tonight. All charges would be taken on the bayonet or with grenades. There

Guadalcanal's draws and gullies were filled with Japanese land mines which had to be tediously detonated by our engineers. Dense growth limits visibility to just a few yards, in the highlands as well as by the coast.

were about 50 rounds per rifle left, and two grenades for every three men. Machine guns also had but a few bursts remaining. Most disturbing of all the Japs were trying to emplace machine guns on the line which we had just evacuated (position "C" on Exhibit A). From there they would have a complete sweep of our positions, and we would be driven from the hill.

We must pull the artillery on to the hill and forestall the charge. My line had gone out, so I used the infantry line which went through a series of switchboards before it reached Tiger Blue FDC. Everybody was tacked in on the line in a gigantic conference call which, looking back, had its humorous aspects. I called our liaison officer with the Marine FDC, Capt. Lincoln W. Stoddard, and gave him the story. It was certainly a great mental comfort to be talking to somebody I knew. We would adjust concentration 941 up onto the hill. The battalion would be firing over the 3rd Bn, to our north, directly at our positions.

"Give me George Battery, Btry 1 rd., Concentration 941."

A voice came on somewhere down the line, "Casey, what is the story? I understand that we are still holding the same positions as this afternoon."

Another voice cut in, "That's right, sir. We are. The observer does not understand infantry tactics; we have just consolidated our lines."

FDC queries, "Is that true, Casey? If so, we can not give you what you asked for."

By this time, we could see the enemy silhouetted on the top of the ridge. Exasperated, I shouted, "Sir, I am sitting in the front lines. I am not on top of the hill. We need fire immediately."

That was good enough for Col. Curry, and the rounds were on the way.

"Left 100. Repeat range."

Someone broke in on the line again, "Cease fire. Those rounds fell too close to the 3rd Battalion."

Another voice cut in, "That's OK, Casey, go ahead."

"Clear the line. FIRE MISSION."

"On the way."

"Left 100, up 50." The rounds echoed through the night, still not quite on the line or in close enough.

"Left 50, up 50." We are creeping now, taking no chances on hitting our own lines. "That sounds better. It's OK for deflection but still got to pull it in more."

One platoon calls in, "Shadows coming down ridge on right."

"Up 50." Wonderful! They are breaking over the wall now, but let's try to get them out on the slope in front.

"Up 25." Cr-r-r-rash! The whole salvo slides over the top of the hill down toward the Battalion CP. The infantry CO says, "That's OK, Casey. Nobody hurt. Go ahead."

"Down 25. Battery 10 rounds."

"Concentration 943 on the way."

The doughboys are with us. They love it. Reports come in from all the companies, "They are landing right in there. Give them some more. Give them hell."

After that it wasn't so bad. The Japs never got their machine guns in place. A few slipped through the barrage, but grenades got them. Not only I, but every doughboy on that hill was an artillery observer that night. Lt. Giesal had wire communication with each platoon and company in the line. When the Japs would start an advance word would be whispered in, "They are coming again"—and we would pour old 943 in there.

It was a funny night. We all had that tight feeling in our throats. Would the Japs withstand the fire and get machine guns on the ridge? Words from the National Anthem rang through my head, "Oh, say does that star-spangled banner still wave . . ."; "o'er Hill 27" was substituted for the rest.

Toward dawn the last sustained attack was hurtled back. It was all right now. It was morning. We were in. I noticed another Jap peculiarity that night which proved the rule later. Every time our artillery started lamming them out, the enemy would open up with their machine guns and mortars. Several times in later campaigns infantry commanders demanded "Cease Fire" of their own artillery when, in fact, Jap mortars and artillery, not our own shorts, were causing the damage.

It wasn't such a bad night after all. We had stopped them cold. No doubt they would be back again, but never would our position be so vulnerable. About dawn one of my men, Staff Sgt. James P. Guild, adjusted the battalion on a draw

leading up the west side of the hill. We brought Concentration 944 in within 50 yards of our left flank. We now had a wall of fire around Hill 27 which was next to impregnable.

Those Marines sure can shoot. They were fast and accurate, and above all 100% cooperative. Their procedure was informal, but it had to be under the circumstances. No sequence of forward observer commands stands up under stress. Their method of conducting fire is much simpler than ours for both the forward observer and the FDC. They do not give sensings; they give commands in yards. You can snap out orders almost without thinking. It is natural and logical.

In the morning the line moved up to the top of the hill again. The artillery was through, for our patrols were out. The second day was about as the first. Prolonged periods of intense fire alternated with ominous silence. Our boys had located several machine guns and snipers by flash during the night, and proceeded to pick them off with dispatch. The enemy radio observer who was planting the mortars so precisely was spotted and knocked out. During the day seven of his brethren met their fate attempting to swing over on vines and salvage the radio.

Toward the shank of the day I crawled up to the line to readjust on the fringe of woods 25 to 50 yards north of the new line. I asked the FDC for Down 200 from 943. On the night before the concentration had broken on both sides of what was now the front lines and I wanted a little leeway. FDC under pressure from the 3rd Bn of infantry, who were still meeting determined opposition on Grassy Knoll, would only give me Down 100. I crossed my fingers and let them fly.

I could not see anything because of the density of the woods, but they sounded pretty good. "Left 50, Up 50, Repeat fire."

The doughboys scrunched down lower. Here they come.

"Marvelous," I reported to FDC. "They broke right along the fringe of the jungle. Give me the battalion."

This adjustment proved beyond a doubt that it is possible to adjust by sound in the toughest terrain. Later in the campaign I had many opportunities to use these methods and they always worked out perfectly.

During the next three days the situation gradually improved. The supply line was reopened, the wounded were evacuated. At night I sat up on the line with Lt. Giesal, calling for special fires when needed. In the daytime we fired the 77-mm field howitzer we had captured from the Japs, and wondered how they felt having their own shells bursting around them. Late each afternoon I would fire the battalion on each concentration, readjusting where necessary. Twice we caught guns which for some mechanical reason were off. One gun started shooting about 400 yards short, but we found it in time to call the battery out before it did any damage.

Early one afternoon "Pistol Pete*" shells began to land too close for comfort. A machine gunner spotted the flash some 6,000 yards to the west. We sent its approximate coordinates, and proceeded to adjust 75, 105, and 155 on the spot. "Pete" was soon neutralized, and intermittent fires during the night kept him quiet. Col. Curry, who came up on the hill a short time later, insisted that we should have used large angle T methods on the adjustment. He figured out the data, but the rain closed in before he got started. I believe his adjustment would have been more precise, but much slower—and when someone is shooting at you, you want to get your adjustment as quickly as possible.

My fifth day out my colonel called and said he was sending relief. I protested that I was fine and would like to stay in until the doughboys went out three or four days later. He was adamant. When I had reached the rear zone after a rugged 2-hour hike I knew he was right. I had been living on nerve and excitement. Now I wanted to sleep for a week.

We learned many lessons from this drive. From then on my teams and I carried pistols and knives, no rifles or tommy guns. We wore infantry packs containing a shelter half, a head net, a pair of gloves, four or five bars of D ration. Most of us had just received Christmas packages, and R&R chicken was only one of the delicacies we feasted on. On a particularly bleak night a Marine observer and I were adjusting our respective battalions on a dangerous sector. Neither of us had eaten much in several days and were nearly past caring. He pulled out a small jar of caviar which he had had in his pack for some time. I reciprocated with a small can of lobster I had been saving. There on the open hills in the driving rain, we enjoyed a feast fit for kings.

Some of the fellows carried a few cans of C ration, but I

Henderson Field was the Japs' objective early in January. This photo, taken shortly after the Japs were originally driven out, clearly shows the almost-completed runway, circular dispersal area, and American planes on the ground. Japan's pagoda-like operations but is on the small rise near the center of the picture. Bombs not only pocked the ground, but also took out a corner of the cocoanut grove at the right.

*The Jap artillery fired seven or eight rounds in a direct line sometime every afternoon or evening. This was the only firing they did. We therefore had the idea that they only had 2 guns which they moved around from day to day. These were quickly dubbed "Pistol Pete" and the "Kokumbona Kid."

As we pushed up the coast we found the Japs had as many artillery pieces as our forces, and in most cases one unit of fire. Why didn't they use it? That is one of the mysteries of the campaign, and a good omen.

found it unnecessary. If the doughboys ate, we received our share. If they couldn't get supplies in we could get by on D ration too. Two canteens, plus chlorine or iodine, were indispensable. We wore combat suits and helmets, no leggings. I carried an M2 compass, field glasses, and maps. The infantry I traveled with used the compass far more than I did.

An OP team generally was headed by an officer and a sergeant—not necessarily an instrument sergeant, but one who had a knowledge of field artillery and could also supervise communications. It also included a radio operator, two wire men, and one or two general utility men. The latter could operate the radio, police wire, run messages, or do any job. All the men had to be tireless. With a party of this size we were able to carry and lay six miles of liaison wire per day, sufficient for this terrain. Each officer and man (except the radio operator) carried two half-mile reels.

If laid correctly liaison wire will stay in and work well up to six miles. Of course, it should be replaced by W110 as soon as possible. We had both good luck and bad fortune with it. If it is laid off the trail with plenty of slack and is policed daily, it is invaluable. An effort was made to make all doughboys wire-conscious. Near the front lines it worked fairly well. We policed infantry lines and they repaired breaks in ours. The chief difficulty with wire communications came in the rear areas, where trucks, supply trains, and bulldozers tore it out faster than we could put it in.

The 194 worked well within its limitations. It was usually infallible on hilltops and along the coast, when not required to work more than six or seven miles. Battalions who had the 511 had about the same results, but the 511 blanked out at night. When the advance gained impetus we used relay stations. The best radio setup we had consisted of two 194s (one with each assault company), one 284 peep-mounted (with battalion liaison officer), and a 245 as a base FDC set.

The number and placement of liaison officers and forward observers depended entirely on the infantry situation. When our battalion was supporting a battalion of infantry we usually had a battalion liaison officer and an observer with each assault company. In some instances, when a battalion was advancing in column of companies toward a known objective, the battalion liaison officer doubled in brass and was also observer—as at Hill 27. We found it paid not to have observers where they were not really needed, such as attached to reserve companies. The whole system had to be flexible.

On one occasion we went from direct support of a battalion to direct support of the regiment. We sent out a regimental liaison and made plans to get two more liaison officers to the other two battalions before morning. Two more observers were given instructions to contact the assault companies of the 1st Battalion on the left as soon as possible.

The plan, which was to attack with two battalions on the line and one in reserve, was changed at 0530. The new orders stated that the regiment would advance in column of battalions in column of companies. We relieved all but the observer with the initial assault company, and the liaison officers.

Observer teams should not stay in the lines for more than five days at a time. Three days is ideal, but this again depends on the number of officers and men available for this duty. In some battalions the junior officers bore the brunt of the work. In our battalion the BCs all volunteered, and spent much of their time in the hills.

Observers and key men from their teams should go out with an experienced observer before they take over a situation on their own. This was the policy of our battalion and it paid dividends. Most of the observers had had even less experience with forward OP firing than I had. None of them had ever been under enemy fire. It was alleged by some parties that a trip with an experienced officer was an unnecessary risk. However, I believe that it was of invaluable assistance to our observers. They got over their first fright. They learned the tricks of the trade before they were called upon to mass fire on strategic targets.

In the early stages Division Artillery (and consequently Bn FDC) kept a great degree of control. Targets had to be designated minutely. Higher echelons, not the observer, would decide how many rounds the target was worth. This situation soon became impossible. More reliance had to be put on the forward observer. He was on the spot. He had to be free to move when he wished and report to FDC when he could. He had to make his own choice as to whether he stuck right with the doughboy CO or crawled up to some spot where he could get better observation. Many are the hills out this way on which artillerymen were the first to set foot.

Target designation was often impossible unless prefabricated. We knew from past campaigns that there were bound to be Jap bivouac areas and CPs in draws and along the roads, but we seldom saw anything tangible. We knew there was something there, although we could not count it or tell what it was. Several times fire was held up by some FDC demanding minute designation. And yet, the next day when we went through the area we would find signs of where the artillery of the night before had shredded some CP or bivouac area.

I believe that, within the limits of sensibility, the observer and not the FDC should be allowed to determine the amount of ammunition to be expended on any one target. He must be aware of the status of the ammunition supply. The Marines allowed their observers much more control than we obtained till the last few weeks of the campaign. I repeat, the observer is the guy on the spot. If his judgment isn't trusted he should not be there.

Our maps varied considerably. On Hill 27 I had a linen overlay of an aerial photo, scale 1/20,750. It was rather unwieldy and clouds on the photo blanked out prominent terrain features. Later we received small gridded aerial photos which fitted conveniently into map cases. They were excellent and accurate. When the advance turned into pursuit we sometimes ran out of maps and had to resort to large G-2 overlays or go without.

As far as movement and disposition of artillery and infantry are concerned, we may never run into a similar situation. However, I believe the conduct of fire will not be too dissimilar on any front.

100%

69th Inf Div Arty may be new as a unit, but it promptly displayed interest and initiative. Within three weeks of its activation, each of its officers became a member of the U. S. Field Artillery Association.

Some half-tracks in North Africa were equipped with 105s instead of standard 75s. Their heavier fire-power was invaluable, and their carriages stood up surprisingly well under the heavier recoil.

ARMORED ARTILLERY AT SENED STATION

By Col. O. W. Martin, FA

On the second day of this operation I was wounded and evacuated. Many details in this narrative I cannot fill in, and probably there are some important inaccuracies. My own position was commander of an Armd FA Bn.

In the big picture, the operation near Sened Station which began 31 January, 1943, was a raid or reconnaissance in force. Considered as a local action, I believe it was typical of that phase of the Tunisian campaign. The American force was a conglomeration hastily gathered around a nucleus of armored troops. It was called Combat Command "D." Its commander was the Div Arty Comdr, 1st Armd Div. The troops were:

Hq Det, Div Arty Comd
1 Hq Co, TD Bn (acting as Hq Co, CC "D")
1 Armd Rcn Bn, less 1 Co
1 Medium Tank Bn (with M4 tanks)
1 Inf Regt, less 1 Bn (not an armd regt)
1 Armd FA Bn, less 1 btry
1 towed FA Bn (not an armd unit)
1 Armd Engr Co
2 platoons, AA Arty (37-mm and twin .50-cal., coaxially mounted)

The —th Inf and the towed FA Bn, although listed above, joined after the operation was under way, as will be described later. The other units assembled hastily during the night 30-31 January, about 8 miles NE of Gafsa. About 0300 orders were issued to march at 0600. Daylight was about 0630, dark about 1800. Objective for that day: the high ground 4 or 5 miles east of Sened Station.

CC "D" was to move along the Gafsa-Sened Station-Maknassy road until contact with the enemy, then across country according to orders to be issued as the situation developed. Rcn Bn to precede the column by one hour. Order of march (as I recall it): Engr Co, Tank Bn, CC Hqs, Armd FA Bn, Inf (not yet arrived). The AA platoons were with the Tank Bn. Field trains remained at Gafsa. The FA Bn marched in the order: Command group with small MG detch in advance, Btry A, Hq Btry (comd group), Btry B, Amm Plt Serv Btry, Maint Plt, Med Detch. Rcn officer and Forward Observers 1 and 2 were well forward.

From Zannouch Station eastward, the road runs through flat sandy country, with little cover, generally along the Gafsa-Mahares railroad. Some wadis run perpendicular to the road on each side, with soft ground in places; these make long movements off the road rather slow and difficult. Sened Station lies in a bowl ringed on three sides with hills 700 to 1,500 feet higher than the road. For the defender, these hills offer excellent artillery, mortar, and machine gun positions; they are very rough and bad going for tanks. Sened Station lies in an olive grove about 1 mile square. (This will be called the Sened Grove.) About one mile west is another olive grove about as large. (This will be called the West Grove.) These two groves offer some cover. Otherwise, the bowl is flat, bare, and sandy.

For maneuver room the tanks had about 1½ miles north of the road and 2 miles south of it. Otherwise, it was poor tank country. The hills were very rough, covered assembly areas did not exist, and all enveloping maneuvers led into alleys with AT guns on both sides. The terrain was more suited to infantry, working through the hills and cleaning out the defender's weapons by sweat and hard work. However, CC "D" had not enough infantry for such use. What we had was strange to us, joined us piecemeal during the operation, and had ridden several hundred miles in trucks to do that.

Until noon 31 Jan, the advance was undisturbed. The Rcn Bn bypassed Sened Station without detailed investigation, and met no fire from the hills. Somewhere east of Sened Station it finally met resistance.

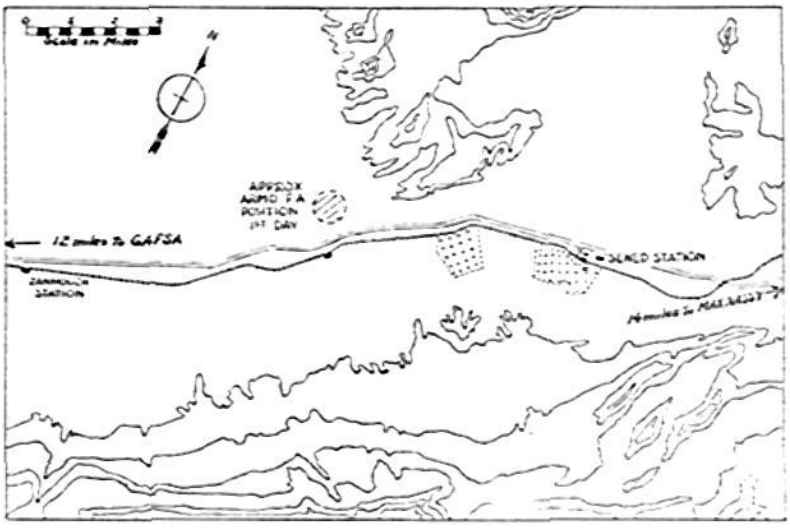
About noon, resistance to the main body developed in the West Grove. The tank column stopped. The CC Comdr had gone forward and couldn't be reached. I was not satisfied to sit vulnerable on the road, and was too far back to occupy firing positions. I pushed ahead in my peep, with 510 radio, while the Bn Exec brought the battalion forward, marching parallel to the road. Six miles forward a position area was selected, ahead of all troops I could then locate. This turned out to be at rather long range from the targets. By about 1430 both batteries were in position with forward observers out. The tanks meantime were having difficulties in cross-country movement into an assembly position north of the road.

Fire missions began to come in without delay. One of the CC Comdr's staff (which was the Div Arty Comd) called for and fired the first mission. The other battery about the same time fired on another target, and later registered on the first battery's target as Bn Base Point. The positions were organized at once. Every man dug a slit trench and AA preparations under our standing procedure were completed. All vehicles were put 100 to 150 yards apart. In this Armd FA Bn,

all .50-cal machine guns had been modified to permit firing practically straight up.

This was barely finished at about 1500 when some low-level and dive bombers came over to attack the Armd FA Bn. Then occurred the worst thing I saw. The 1st Bn —th Inf had overtaken us and had come up on the road about one-half mile from the FA positions. Here the trucks closed up, only a few yards apart, and the men upon dismounting grouped around them. This infantry was not organically motorized. The trucks transporting it had no appreciable AA armament.

As the enemy planes approached the FA position, all MGs attacked them. The men not manning guns took to slit trenches. We had only 10% tracer ammunition, but apparently this had its effect. Only a few bombs fell near the FA, and the planes veered away to the south. The dismounting infantry was a wonderful target, and the bombs plastered them.



The plan of attack gradually clarified to about this:

The Inf Bn was to advance frontally and seize the West Grove. The Tank Bn was to envelop the hostile north flank. The light tank co of the Rcn Bn was to cover our south flank initially, and eventually to envelop the hostile south flank. The Armd FA Bn was to support the Inf Bn until the West Grove was captured, then switch to support the Tank Bn.

While the other troops prepared to attack, the FA forward observers conducted fires on guns detected in the olive groves and machine guns in the hills. Such targets are hard to observe anyhow, and the observers were not close to them. The fires probably were not too effective but they helped the morale of the infantry, and perhaps encouraged the tanks too. Both FA planes went up to observe. They went much too far forward, but still could not spot the targets on the rough hilly terrain. These air observers must have some means of magnifying vision.

There were 2 or 3 more small bombing attacks. The Armd FA Bn had no losses, and claims 2 planes shot down. One FA plane was in the air during a bombing attack, but landed safely. I believe a few tanks were hit.

By dusk the Inf Bn had established some sort of a line just in front of the FA, about two miles short of the West Grove. Here it was ordered to remain on outpost. The Tank Bn had begun an attack north of Sened Station but had run into AT resistance and made little progress. At dark the Armd FA Bn, being practically in the outpost line, withdrew about 1,000 yards and organized all-around defense. After dark the Tank Bn moved to an area in rear of the Armd FA Bn, somewhat intermingled with it. During the night the Armd FA Bn resupplied its ammunition expenditures by half-track from a DP 35 miles in rear. The main item needed was 20,000 rounds of caliber .50, to replace that used in the 3 or 4 bombing attacks.

This day showed the importance of AA measures: dispersing vehicles 100 to 150 yards apart, digging slit trenches as soon as a position is occupied, and using effectively the caliber .50 MG's. We need fully three times as many digging tools on our vehicles. We took every tool we could find on casualties and abandoned vehicles. Vehicular weapons must be modified so they can shoot straight up. The morale effect for the soldier who feels that he can fight back, and the bluffing of the pilot with a curtain of tracer, more than repay the expenditure of ammunition and the difficulty of hauling it. We should have at least 20% and preferably 50% tracer for the caliber .50 MG, since it is the tracer that is seen by the enemy fliers.

During the night 31 Jan-1 Feb, Regt Hq and 2nd Bn —th Inf came up by truck to join CC "D." The outpost, which was the 1st Bn of this regiment, let the part of 2nd Bn run through it in trucks. It went all the way to Sened Grove, and detrucked on the edge of the grove, right up against the enemy, and the trucks came back. All this occurred practically without opposition. I believe a few shots were fired. Nevertheless they were in a very bad spot. Fortunately they found many empty trenches, relics of an earlier raid on Sened, and dug enough more to get cover. Next day they were pinned down, too far forward to get orders, under continuous artillery fire and bombing, and lent no aid to the attack until late in the afternoon.

About 0700 1 Feb, the unit commanders assembled for orders and I learned for the first time that a towed FA Bn, equipped with British 25-pounders, had joined CC "D." The plan announced was:

The —th Inf Regtl Comdr was to reassemble his two battalions and attack frontally at 0900 to seize the West Grove, thence attack at 1100 to seize the Sened Grove. As soon as the second infantry phase (against Sened Grove) was under way, the Tank Bn was to make a close envelopment of the north or south flank, as the situation indicated. The two FA Bns, under my command, were to support the Infantry until the tank attack began, then switch to support the tanks.

These orders received, I turned to arrange things with the towed FA Bn Comdr. Just then a sizeable bombing attack developed, so we dived into a ditch and completed our business there. Several of our fighter planes appeared, and in the scrap up above several of each side were shot down. One plane fell not far away and burned; soon its bombs blew up. Altogether our conference had interruptions. The towed FA Bn had come up in the night, had bivouacked, had received no orders, and had made no reconnaissance. I assigned it the area south of the railroad for reconnaissance and positions, arranged a radio hook-up with the Armd FA Bn (my CP), and promised to send a liaison officer. After giving these rather meager instructions,

I went to see what damage had been done to my own battalion by the bombing.

One 105-mm SP (T-19) had taken a direct hit, and the vehicle and its ammunition trailer were blazing. Shells were exploding a few rounds at a time, making a homemade barrage in the area. A couple of wounded men were being evacuated. This was the only gun of this Armd FA Bn put out of action in all the February operations and it was back in service later that month. There is no excuse for abandoning or destroying materiel. We *must* recover it, or fight until nightfall when it can usually be gotten out.

After this, my immediate concerns were: The infantry dispositions were not clear; the Armd FA batteries were not displacing fast enough or far enough; the distances of Armd FA observers from the FDC were causing radio trouble; it was hazy as to when the towed FA Bn could be in position.

Accordingly, I took my half-track and peep and went on a tour of personal liaison and reconnaissance. By personal reconnaissance I got one Armd FA battery into a better position; found that the towed FA Bn was pushing its reconnaissance; found several of the Armd FA forward observers were poorly placed, and moved them; and about 1100 found that the infantry had passed through the West Grove and was advancing on the Sened Grove. While in the West Grove, I used my 510 radio to fire a concentration on an occupied part of the Sened Grove. The half-track drew too much fire, and I left it in the West Grove. As we went into the open between the groves, even the peep drew a little fire, and it thickened as the driver and I went forward.

This battery is in action at Sened Station. Executive's half-track has AA protection too.

Infantrymen were in holes all about. A few were advancing slowly. There was considerable MG and mortar fire from the Sened Grove and hills. Shrapnel from an artillery battery particularly was damping the advance. I saw the flashes of this battery in a cactus grove about 1000 yards north of Sened Station. While trying to get a better observing position between 1200 and 1300, I was hit by shrapnel myself and my left arm was broken. Both channels of my 510 radio were busy on fire direction shoots which I could not interrupt without upsetting things. Accordingly I worked back to my FDC, on the way discovering that the towed FA was in position and registering, getting minor repairs enroute, and there arranged for fire on the enemy battery. After visiting CC Hq about 1500 hours and conferring with the CC Comdr, I was evacuated soon after, but the battalion sent me word later that the enemy battery had been demolished.

Sened Station was taken that night by coordinated action of tanks, infantry, artillery, and air. A couple of Armd FA peeps were blown up and damaged by mines while advancing in the dark.

COMMENTS

Armored Action

Successful armored action requires adequate maneuver room. Air superiority is a great help. Communications must be perfect. Armor cannot butt its head against a wall of emplaced AT guns, minefields, etc., without proper reconnaissance. Infantry accustomed to operating with armored units is requisite in greater proportion than has been furnished heretofore. Antiaircraft should be as closely attached as the Tank Destroyer Battalion has been.

Training

The courage, resourcefulness, and lack of "jitters" with trained men was a revelation to me. In their first action, they might have been maneuvering in Carolina. Things went smoothly. The point is that training must never stop, wherever you are. We trained — fired service practice and small arms— every time we could, even after landing in Africa. Every man must be able to fire every weapon creditably, his own weapon expertly. In the first few days of fighting the "old man" has to umpire his own unit, as it were, getting around everywhere to see that everybody is doing things properly. These are the days when he finally clinches his training, but he is likely to get hit while doing it.

Fire Direction

The Fort Sill fire direction methods proved satisfactory. We used principally observed fire charts built up from forward observer adjustments. We had neither time nor suitable maps for more deliberate methods. I feel that an artillery battalion must be kept together to provide the mass of fire that really clears or neutralizes an area. Sometimes a detached battery may be necessary, but detaching one battery reduces the effectiveness for which artillery is organized. A large headquarters battery is provided to manipulate the fires; when batteries are detached, this fire direction organization might as well not exist.

AA Precautions

Dispersion is vital. In open country vehicles must be 100 yards apart, preferably 150 yards. On roads likely to be strafed, 200 to 300 yards between vehicles is indicated. Keep off roads in the daytime; haul supplies at night. Sometimes chances must be taken with the ammunition platoon, which should have armored vehicles.

We modified caliber .50 MG's by placing a side-plate or riser on each side of the gun, raising it from the cradle some 8 or 10 inches; this permitted the guns to point almost vertically, left them as free guns, and made effective weapons of them. They could then be fired from the skate mount, the

pedestal on the T-19, or from tripod mounts which we had improvised to place around areas occupied for a considerable time. Up to 50% tracer ammunition is desirable.

Work done in digging slit trenches over Ireland, England, and North Africa was not wasted. Holes went down automatically, and in our first action they saved many lives. Every man who is not manning an effective AA weapon or firing an important mission must be forced underground.

Courses in airplane identification, both enemy and friendly, are not a waste of time. They help to prevent shooting down our own planes.

Liaison Officers

Liaison officers carry their weight in combat. Forward observers can do little liaison work, since they must be hunting good ground to observe from. There are never enough liaison officers when an Armd FA Bn must switch from support of infantry to support of tanks; and when towed FA is attached, a good liaison officer must be sent them who can explain the oddities of armored warfare.

Forward Observers

Maneuvering the forward observers so as to have them at the proper place at the proper time becomes a highly important tactical and communication problem. *Every officer* in the battalion must be a well-trained forward observer who has seen a lot of firing on all kinds of terrain and who has occupied OPs axial, lateral, flank, ahead of the target, not only on high ground but also on flat ground. He must be expert at voice radio transmission. Each soldier in an observer section must be able to replace his officer.

One difficult thing with courageous young observers is to keep them from forgetting their job and getting into the tank fight. They must be taught that combat for them is in self-defense only. I had three tanks in my Armd FA Bn—one M3 light, one M3 medium, and one M4 medium. The observer's tank must be the same as others near him, otherwise he is too conspicuous. I had quite a job switching my tanks around to accomplish this. Observers must have field glasses of at least 8-power to pick up and identify well-placed enemy weapons. Observing distances often are greater than one would like, even for forward observers.

Communications

Our radio was obsolescent. We had ten SCR-193 sets and twenty-four SCR-293 (Link) sets in half-tracks, and ten SCR-510 sets in peeps. We had one SCR-528 in a tank, and its flexibility was a revelation. The strictest radio discipline is necessary. Handset extensions must be provided to the FDC in adequate quantity so that vehicles can be dispersed and the FDC still function.

Firing Batteries

The pieces seldom go into position with any regular pattern; it may be a ragged oval or a ragged cross or almost any shape, each piece taking advantage of the ground and cover. For precise gunnery the sheaf is a matter of concern, especially with pieces 100 to 150 yards apart. We found that with a mere two or three minutes' work we could improve the sheaf greatly by convergence, using a device board which basically was the same as the Sands Graph described by Capt. H. I. Holdeman in THE FIELD ARTILLERY JOURNAL for April, 1943, and developed independently by Maj. E. H. Burba in my battalion. This method may seem complex, but my officers learned it in 15 minutes one night and used it the next day.

With the pieces 100 to 150 yards apart, the executive cannot see all of his pieces from any one point. He must command by some intercommunication system, and he and the assistant executive must move around from piece to piece to maintain personal control and check on accuracy.

Each firing battery ran single lines from each gun to the executive; strict discipline was necessary on these phones, and there were difficulties from jarring during firing, and from wet weather. I suggest a small shoulder receiving-and-sending set for each chief of section, and consider this solution better than a public address set, which is dangerous when you are surrounded at night because it locates your position.

We found the T-19 carriages very satisfactory. They travelled hundreds of miles in the United States, made many maneuvers and marches in Ireland and England, and considerable distances in Africa. If maintenance (particularly 1st and 2nd echelon) is kept up, they will go places. The motor may be somewhat underpowered since the heads were changed, but the vehicle is rugged and still gets there. Its gasoline consumption is half that of the M-7. Blurring of the panoramic sights gave some trouble.

The valley is so flat that no ground OPs were of much use. Any handy small building was immediately put to use.

Liaison Planes

These planes fill a need and are handy to have, particularly in flat country. They are vulnerable and hard to keep in repair. The landing gear broke repeatedly and the Bn Maint Sec improvised repairs. Observation with the naked eye is unsatisfactory, since the plane must remain below 600 feet and near the battery position. Perhaps the observer could be aided by glasses of about 4-power, worn as spectacles, similar to those worn by spectators at races.

Thala Engagement: February 21-24, 1943

By Maj. Evert E. Strong, FA

At Tebessa the 9th Div Arty (less the BPth FA Bn and plus the NQth and FTth Cannon Cos and HNth FA Bn, attached) was ordered to continue its march to the vicinity of Thala, Tunisia, and occupy positions. This order was received at 1530, Sunday, 21 February 1943. The Commanding General immediately went forward on reconnaissance, after ordering the Battalion Commanders to follow at once with their Battalion Parties and report to him at 1900 at Kalaa Jerda, Tunisia, prepared to reconnoiter positions. The General and a reduced staff proceeded to the V Corps Headquarters at Dj. Konif, Tunisia. These orders were received placing the 9th Div Arty and attached units (less the BPth Field Artillery Battalion) in support of the British Army Forces who were resisting the German drive south of Thala. Gen. Irwin contacted the British commander at Thala at 2000, Sunday, 21 February, and with him made plans for the defense of the positions south of Thala.

The Battalion Commanders reported at Thala and were ordered to reconnoiter and occupy positions as soon as possible, with the objective of firing in defense of the position at daylight 22 February. The NQth Cannon Co was attached to the MDth FA Bn and given the mission of defending their right flank against possible enemy tank attacks. The FTth Cannon Co was attached to the PJth FA Bn and given the mission of defending the right flank of the latter from enemy tank attack.

At the time the 9th Div Arty entered the action the British Forces consisted of 3 platoons holding a line across the road south of Thala, supported by an Armored Group (consisting of 24 tanks of the English Mark IV type), 22 British 25-pdr guns, 12 Bofors AA guns, 2 batteries of AT guns, and 12 light TD guns.

Enemy forces at this time were estimated to be the remnants of the 21st Panzer Division, consisting of approximately 40 medium tanks, 2 to 3 battalions of infantry, 3 batteries of 105-mm guns, a battery of 150-mm howitzers, several 88-mm dual purpose AA-AT guns, and a considerable amount of anti-aircraft guns.

When the 9th Div Arty entered the engagement the enemy had been vigorously pushing forward, having breached the Kasserine Pass and advanced to a line approximately six kilometers south of Thala. During the night of 21-22 February there was very little action except for occasional harassing rounds of artillery fire, and a small tank counter-attack by the Uth Armored Division.

The early morning hours of Monday, 22 February, were spent in occupying and preparing positions; by 0500 all units were in position ready to fire. Gen. Irwin had established a forward command post near the CP of the British Tank Commander. At daylight registration was started, but it was not accomplished until later in the day. All batteries of the PJth FA Bn and the HNth FA Bn fired throughout the morning on targets of opportunity, most of these targets being enemy tanks.

At 0945, "C" Btry, HNth FA Bn occupied exposed antitank positions on the Thala-Kasserine road. Enemy artillery and direct-laying weapons immediately opened fire. "C" Btry returned the fire until three of their guns were knocked out. The fire of "C" Btry knocked out at least one enemy gun. The pieces were taken out of position and removed to their original position, at which point one gun was repaired.

Shelling of the positions and of the OPs was continuous throughout the day. Very little damage was done compared with the number of rounds fired by the enemy. The guns of all units of the 9th Div Atry fired with very good results on the enemy positions throughout the day. Morale of the men was high even though they had not slept for more than 24 hours.

During the day the action had been limited to a tank battle in the early morning followed by an artillery duel continuing throughout the day. This was due to the very small amount of infantry present. In the afternoon our positions were strafed and bombed several times by a small flight of enemy planes. Damage was very slight, one gun being damaged and 3 men killed. Our planes came over later and bombed the enemy. The combined efforts of the British and American artillery definitely halted the Axis advance, and when night fell the lines held by both sides were much the same as they had been in the morning. At dark action ceased on both sides.

During the night there was practically no action; several times unidentified planes were over head, but no bombs were dropped nor were the planes fired on. Some explosions were heard coming from the enemy lines.

At daylight 23 February the action began by firing from the British tanks. Our guns fired for some time on targets of opportunity. During the morning the battalions fired several division artillery concentrations. All battalions continued to fire during the morning on any target available. There was very little action from the enemy. At 1445 all firing ceased in order to let reconnaissance parties advance. Their reconnaissance proved that the enemy had retreated, and the British forces moved forward.

At 0600, 24 February, 1943 these reconnaissance parties reached the Kasserine Pass, but no contact had been made. This ended the engagement.

Four guns were damaged at one time, and were removed to the rear areas. They were only slightly damaged, and so were back in two or three days, ready for action.

Considering the amount of shell-fire received the casualties were very light. Morale of the men was very high, and the retreat of the Germans gave all men an increased confidence. The experience gained will be of great value in future engagements. The level of performance of all men and officers was exceptionally high. There was not one straggler and, in spite of the heavy concentration of enemy artillery fire on battery positions and OPs, the division artillery was never neutralized. It was a fine demonstration of courage and coolness on the part of all ranks.

DEFENSE OF AN ISLAND

By Maj. Charles B. Cross, FA

Terrain plays a major role in any defensive plan. This is decidedly true on an island. There is no such thing as the "only solution." Any plan that is tactically sound and fulfills the mission is a good plan. There may be several of these, and who is to say which is the better? Here is *a* plan.

Your battalion of 105 - mm howitzers is part of a force defending an island. Your subsector has two bays, one river, and many good landing beaches. You have two hill masks close to the shore. One ridge is parallel to the coast line and about 2,000 yards inland; its elevation varies from 700 to 1,000 feet. The other starts at the shoreline of the larger bay and runs diagonally across the southerly end of your sub-sector; this range has elevations from 800 feet to 2,200 feet. The center portion of your area slopes gradually upward from the water's edge. Inland the country has deep gullies and canyons, interspersed with agricultural fields. These canyons wind their way upward toward the high mountains. In places they are gorges, while in others they are 100 feet deep and several hundred yards wide. They are covered with trees and dense underbrush.

In emplacement "A" the howitzer rotates about a raised disc, to prevent lateral displacement when trails are shifted. Spades fit against circular curbing, to eliminate set-back. Niche for ammunition storage is fitted with hinged "cupboard" doors.

It is highly conceivable that the enemy might effect a landing either north or south of you. This necessitates that you be able to fire on your right and left flanks. To your rear is a valley. The enemy, if successful in landing, might infiltrate into this valley. Therefore, from your selected positions you must be capable of delivering massed fires in all directions on call.

Your assigned seacoast is in excess of 25,000 yards, but luckily is on an arc. Your requirement is to be able to mass the fires of all batteries on the river (north flank); at least two-thirds of your fire power on a prominent seacoast point (south flank); and cover all of the intervening coastline. Old British 75s will be used as beach guns to augment infantry fires at critical points; your excess (?) personnel will man these 75s.

Now comes the leg work. If you put your howitzers too close to the shore, an enemy surprise raid might take them out. Besides, you can't stretch your fire to cover the required front. On the other hand, due to the curve of the coast line it is possible to accomplish your mission from positions farther to the rear.

The fire requirement of your mission narrows the possible location of your firing batteries to a comparatively small goose-egg. You would naturally like to keep the positions close together to facilitate fire direction operation. You also desire masked positions to assure flash defiade. Keep in mind that you must be able to fire in all directions. This in itself blocks many otherwise satisfactory locations. It is disconcerting to locate a splendid position, defiladed and well covered, only to find that your minimum elevation in one direction is 650 mils. You therefore spread your batteries in depth and width to secure good protection.

As a result you end up with your batteries well protected in deep draws that afford natural camouflage, but the units are spread 1,500 yards in depth and 2,000 yards in width. You will agree that this is not the ideal situation for massing fires from a fire direction center. You are right. But it can be done. Each computer figures an individual metro message for his battery, and applies the corrections to his battery only.

The shore line is occupied by infantry. Civilians are living and farming inland. Therefore you select grid intersections (check points) approximately 1,000 yards offshore, and with map data corrected you fire center of impacts with the base howitzer of each battery. Corrections for each battery are recorded. With these corrections the battalion can mass its fires on any target within transfer limits. A range deflection fan centered on the battery positions will show you how many check points are needed.

In such a plan, survey plays a major role. The exact location of the base pieces, base points, and observation posts becomes mandatory. Speaking of base points, we know that when we make large shifts the sight moves around the tube. This offset error is in direct proportion to the distance to the aiming point. Distant aiming points are not always possible. In all-around fire, why not have several base points? This data is recorded. The commands going down to the firing battery are *Base Point No. 1, Right 100,* or *Base Point No. 3, Left 150*. A base angle is computed to lay the battery on each

base point. Referred deflection is recorded. The exact positions of wheels and trail spades are marked on the ground. At the command *Base Point No. 2* the cannoneers shift the piece, and by use of the marks are able to place it in exactly the same alignment as it was when initially laid.

The observation posts are placed on the two ranges near the coast line. From positions on this high ground you can see inland as well as out to sea. Any suspicious looking object can be reported with reference to a base line or azimuth. When the object is located by two observation posts its position can be plotted by intersection; this method is the same as that used in a center of impact adjustment. In addition, each OP has a grid sheet (maps are scarce) with the coastline drawn in, and observation posts and howitzer positions located, together with their altitude. With this information any observation post is capable of conducting the observed fire of its battery or of the whole battalion.

As'a further precaution against eventualities, each battery has its own trained fire direction center prepared to operate for the whole battalion or as a decentralized battery unit.

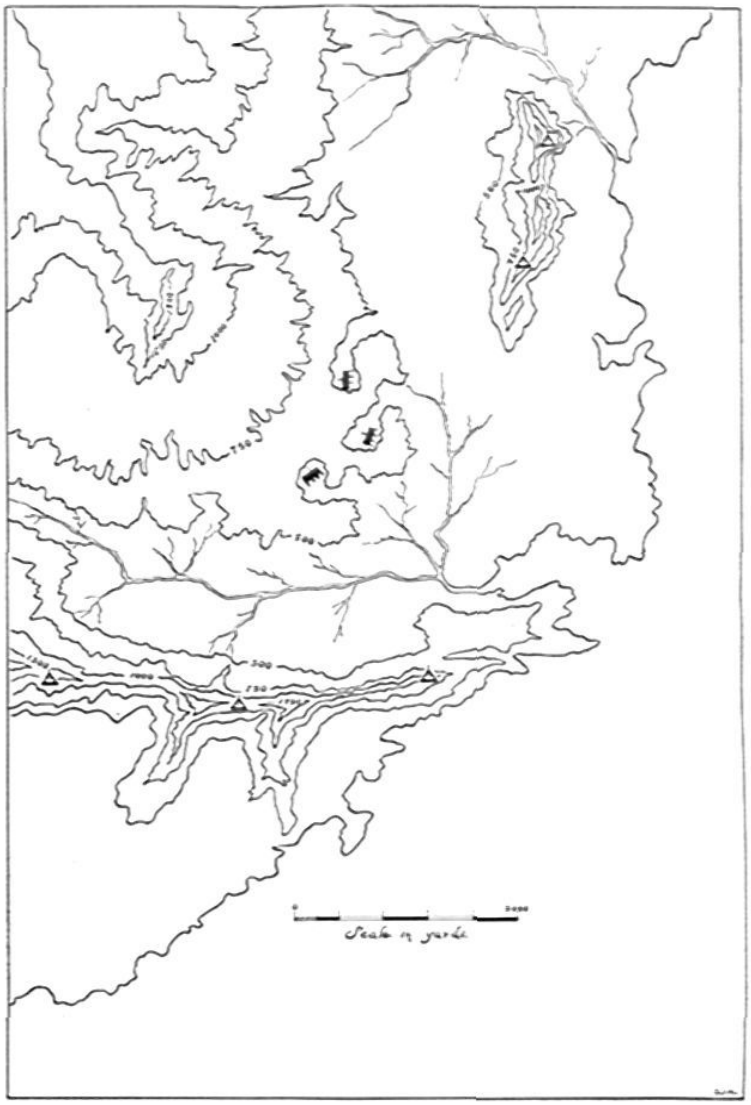
Now let's take a look at one of the firing batteries.

The living quarters are far from the pieces, well dispersed under the dense trees in the canyon. You don't want these men to give their lives for their country. It is much better to keep them alive, and let them help some Jap give his life for his country. Rather than deep bomb-proof shelters you have a multitude of slit trenches, long enough for a tall man, deep and narrow for his protection. Information from Bataan tells you that a slit trench is the better of the two types of protection. They found that 20 feet of solid cover collapsed under a direct bomb hit. A good slit trench is protection against anything except a direct hit.

Covered path from quarters to howitzer position.

A skeleton crew is kept on duty at the howitzers at all times. In case of an alert the remainder can get there quickly by covered routes. The howitzers are in either a diamond or "W" formation, which allows you to have 60 yards between howitzers for over-head fire. If you plan to fire in all directions you can't help but fire at least one howitzer over the heads of another howitzer's crew. Sixty yards is a safe distance.

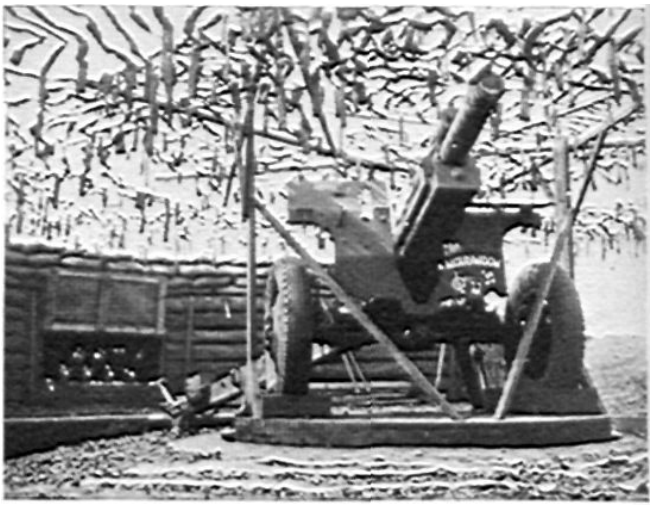
Circulation is kept to wired-in paths and roads. All of these, as well as the howitzer pits, have over-head camouflage. Of course, you don't have enough fish nets for this purpose, but chicken wire is available and for more or less permanent installations is better than fish nets. The camouflaged road is a necessity, as there is always the possibility of being ordered to occupy alternate positions near either flank of your sector to support a counterattack or to cover a withdrawal.



In the alternate locations you will use your fish nets for camouflage purposes. You have the howitzer positions leveled, and the base piece located by survey. The orienting line is staked in. Later, if time permits, these positions will be further improved. At present your major problem is the improvement of your main battery position.

The dense undergrowth and the conformation of the ground make it impossible for the executive to see all four pieces from any one position. To overcome this condition, a camouflaged platform has been erected. The executive only mounts this platform when laying the pieces; at all other times he controls the firing battery by phone from a camouflaged trench. The distance between pieces is so great that his voice can not carry in the din of battle. The necessary phones are not shown in your table of basic allowances, but it is surprising what an

Emplacement "B" has a curbing similar to "A's" for spades, but howitzer itself rests on a turn-table where it is firmly blocked in position.



Emplacement "B's" ammunition is kept behind full-size door hinged at the top. Notice the piece's affectionate name!

ingenious group of men can accomplish. One battery secured an order from the quartermaster authorizing them to pick up "one load of used lumber" left on the dock after the unloading of our convoy. They showed their order at the main gate, but departed by the side gate. The guard at this side gate did not know he was to pick up the lumber order. When this battery had secured the necessary lumber to complete its program, it traded the lumber order to another battery for a certain amount of Irish potatoes. Both white potatoes and lumber were scarce.

You know that the enemy will bomb the one good road around the island. This necessitates more leg work, for you must find back roads, farm roads, lanes, and even trails that lead in the desired direction. Then, with the help of combat engineers, you connect these roads to the rear of your position area. Keep in mind that new roads will show. Try to route these connecting links through woods and gullies with underbrush, to facilitate camouflaging.

Our next job is close-in defense. The area must be completely surrounded by barbed wire entanglements, with removable barriers on each road. The Japs have a habit of throwing grass mats on the entanglements and thus crossing them. To prevent this the entanglements should be 90 feet deep, with two lines of posts six feet high carrying six strands of wire. On each side of the posts should be a seven-wire apron. In the center area a continuous concertina helps greatly. Tin cans with a few pebbles inside should be hung all over the barricade. The value of these cans as an alarm cannot be underestimated. Trip wires are laid across danger areas by staking single strand barbed wire about four to six inches above the ground. It is very disconcerting to trip over this wire.

Two and a half units of fire are given to each battery. A half unit is stored at the truck park (available for displacement), and two units are kept in the vicinity of the firing position; 100 rounds are stored in four boxes dug into the sides of the gun emplacements. The remaining rounds are stored in tunnels dug into banks. These tunnels are from 10 to 25 yards from the howitzer emplacement.

The infantry are installing new wire entanglements along the beaches. They have appropriately named it "misery wire."

TUNISIAN POSITION AREAS

In general, artillery positions for offensive action were farther to the rear than expected. This disposition was influenced in part by the open terrain and excellent observation. Ammunition expenditures reflect these dispositions, in that 70% of some higher increments of propellants is being expended.

Individual pieces are disposed in staggered positions, with the interval between pieces varying from 75 to 125 yards. The governing principle appears to be that enemy air must never have a run over more than two weapons, and thus to limit casualties by air bombing. One armored group disposes its pieces on a circle of about 200 yards in diameter, with the executive in the center.

Executives control howitzer squads by EE-8 telephones; sound powered handsets would appear to be more suitable. There appears to be a need for a device whereby individual weapons can be corrected quickly for position relative to the base piece.

In one operation the Germans are reported to have placed the mass of their available artillery so far to their rear that it could reach but a limited distance into our areas; this of course greatly hampered our counterbattery. In addition, the Germans made extensive use of roving guns for harassing missions.

GRAPHIC COMPUTER

By Lt. Edward C. Smith, CE

WHAT IT'S FOR

The standard use of maps, firing charts, and grid sheets for conducting the horizontal control necessary to accurate field artillery firing is satisfactory where reasonably decent weather conditions can be relied upon, and where there are relatively few targets for which data must be calculated. In actual field work, however, sometimes far removed from a fine assortment of plotting equipment and where OPs and CPs requiring a four- or five-man crew are difficult to maintain, standard methods may be cumbersome and difficult to handle under adverse conditions.

It was under such conditions in a Theatre of Operations that the Graphic Computer described herein (Fig. 1) was developed and used successfully in actual firing practice. It met the exacting conditions of almost constant inclement weather, high winds, exposed OPs and CPs or cramped quarters with the personnel huddled out of the wind and rain, and the necessity of being able to fire at previously surveyed targets or at targets of opportunity in any direction. The Graphic Computer is rugged enough for use under actual war conditions, and is so universal in application that it can be used to compute the horizontal fire-control data for practically any type of artillery problem for any target within the range of the guns. This includes such problems as laying a battery by an orienting line and base angle, by compass, or by an aiming point. It also includes the conduct of fire by air-observation methods, high-burst adjustment, CI adjustment, forward observation, and (where data is available) unobserved fire.

Many batteries have at least semi-independent missions, operating under battalion supervision rather than immediate control; example: coast defense mission. They have pre-selected positions—often quite a number of alternate positions. These are frequently on promontories or peninsulas, and call for all-around fire. Uncorrected map data must be quickly available for a large number of targets from each such position. Exposure to wind and weather makes computation difficult at these several positions.

To meet these specialized conditions, Lt. Smith's Graphic Computer was devised. It has worked out well in an overseas theater. A few cautions, however:

a. **It necessarily abandons the theory of the proportionality of K, which involves individual computation of yardage corrections for each target, sacrifices some accuracy, and may be confusing if several K's are involved.**

b. **Battalion fire direction is awkward with this device—one must remember the Computer is designed for *battery* use only.**

c. **With centralized control, even the battery will have little use for this instrument. Batteries rarely predetermine their own data in such case: FDC does the job quickly and accurately. Again, remember that the Computer is designed for the *independent* battery.**

The Graphic Computer combines in one unit a firing chart, computer's slide rule, range-deflection fan, protractor, and scales for measuring forward observation sensings in both yards and mils. It can be used to convert automatically from meters to yards where the only available maps are based on the metric system. Yet it is easy to learn and easy to use.

WHAT IT'S LIKE

The Graphic Computer consists of a rotating circular disk on which is mounted a grid sheet of such scale that the radius of the disk is at least equal to the range of the guns. Its edge is calibrated clockwise from 0 to 6400 π, preferably at 5-mil intervals; this scale is for use with orienting lines, Y-azimuths, and compass directions.

Surrounding this disk is an outer scale, also at 5-mil intervals, which carries two sets of numbers. One set runs counterclockwise from 0 to 3200 and continues from 0 to 3200 back to the starting point; this scale records base angles. The other set of numbers on the outer scale are the most important; they read clockwise and counter-clockwise from the starting point, 0 to 3200, and are for setting off the deflection correction and for reading all deflections and base deflections.

The disk is pivoted at its center and turns freely within the outer scale. The grid-sheet mounted on the surface of the disk should be ruled accurately at 1000-yard intervals and preferably subdivided at 100-yard intervals. Commercial grid paper ruled in 1″ squares and subdivided to tenths of an inch can readily be used for this. Letting one inch represent 1,000 yards on the ground gives a scale of 1 : 36,000; other scales can be used where desired. The 1000 - yard grid lines should be numbered so that the Y-north and 1600-mil lines are numbered as plus 1, 2, 3, 4, etc., and the 3200- and 4800-mil lines as minus 1, 2, 3, 4, etc., thus separating the disk into four quadrants. Minus figures should be entered in red.

Mounted on top of the rotating disk, pivoted to turn freely and independently of either the disk or the outer scale, and with the point of pivot exactly in line with its top edge, is a modified Computer's Slide Rule with a transparent celluloid slide to facilitate reading the calibrations. At the free end of the rule is a fixed L-shaped celluloid scale for reading deflections resulting from forward observation sensings. On the fixed portion of the slide rule are scales to read range, 33 R, and 50 R; this range scale is a linear scale, not logarithmic. On the slide stick (one for each charge to be used) are scales showing elevation, drift, and *c* (figures taken directly from the range table). At the pivoted end of the rule is an additional scale that reads plus and minus from 0 to 500 or 600 yards (more if desired), opposite which can be matched the arrow marked "K" on the slide stick at any figure for the proper K correction. It should be noted that this K is not yards per thousand, but total yards correction to be applied at whatever range the target is from the guns; this setting need not be changed during adjustment on a target

because the sensings will automatically compensate for any such slight corrections.

The transparent celluloid slide (Fig. 2), which slips easily lengthwise along the rule, has mounted to it and at right angles to the edge of the rule, a scale that measures up to 1,000 yards (or any convenient amount) for measuring and plotting the sensings as received from the observer. It is also used for plotting the location of targets of opportunity from any known point within the range of the guns, whether it be a base point, check point, or point of known coordinates.

On the under surface of the L-shaped transparent scale fixed to the free end of the slide rule is engraved a fine hairline exactly in line with the top edge of the rule, to permit reading the circular scale on the outer edge of the rotating disk and also the scale surrounding the disk. This must extend beyond the edge of the rotating disk. It also includes calibrations 0 to 50 mils right and left from the hair-line, for measuring deflections resulting from observer sensings. It is designed so that a pencil mark may be made on the chart at any point from which a reading is to be made.

How to Use It

Computing the Location of Points to Be Plotted

Base piece of the battery is always assumed to be at the exact center of the chart. That is, on the basis of coordinates, the coordinates of the gun position are always assumed to be 0-0. Thus any point plotted on the chart will be in its true relation to the gun position, no matter what the sector of fire may be.

To plot any target and other points on the chart, it is only

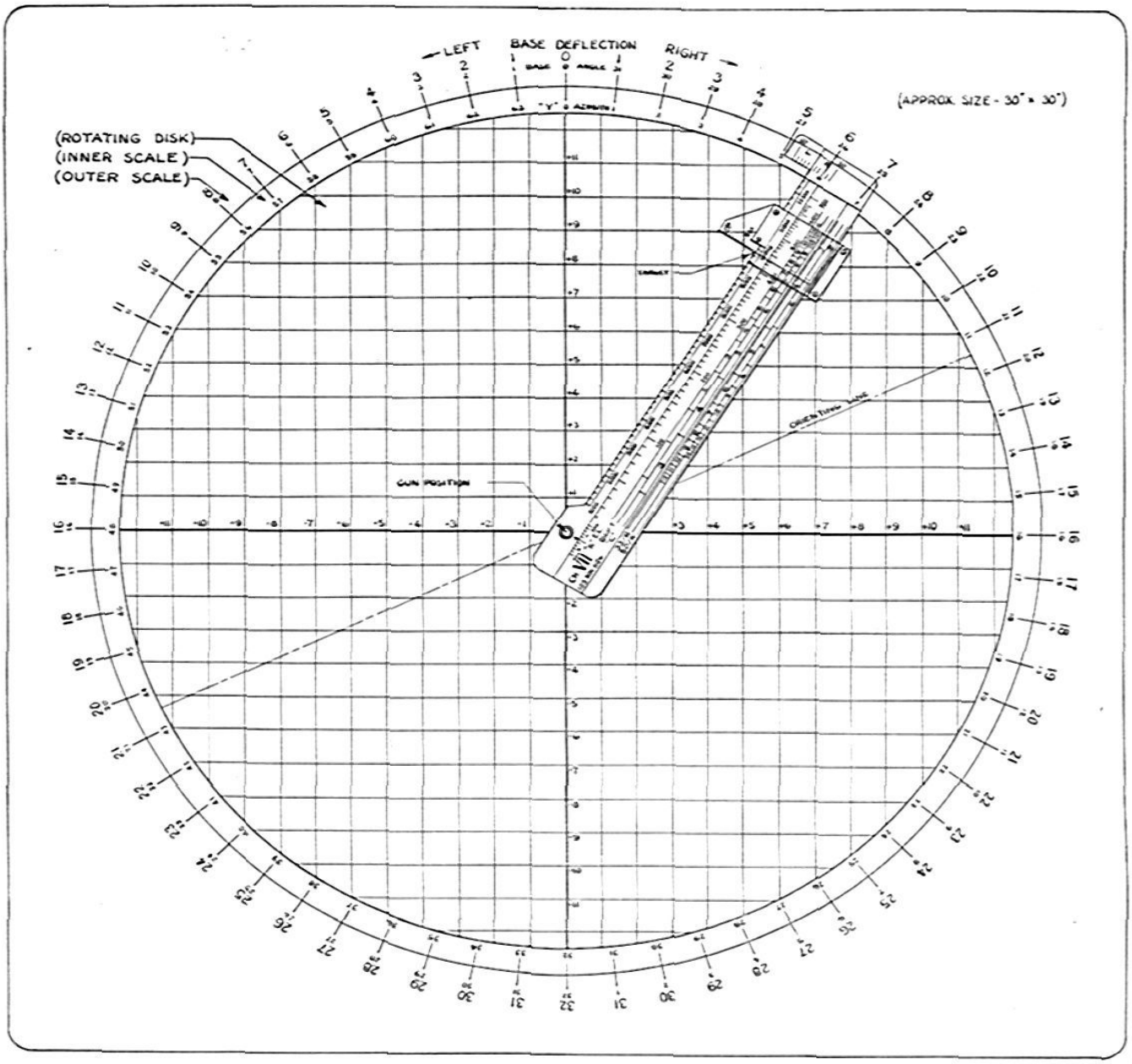


FIG. 1

necessary to subtract the X and Y coordinates of the gun position from the X and Y coordinates of the point. Just as in the trigonometric method of calculating Y-azimuths and ranges, if the differences are both plus the point will be plotted in the first quadrant; that is, the target is to the east and to the north of the gun position. If the X-coordinate difference is plus and the Y-coordinate difference is minus, the point will plot in

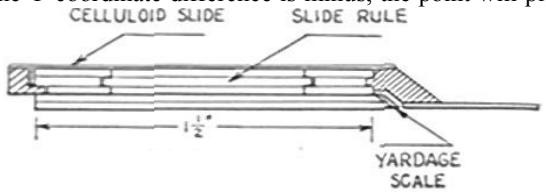


FIG. 2

the second quadrant; if they are both minus it will fall in the third quadrant, and if the X-coordinate difference is minus and the Y-coordinate difference is plus it will fall in the fourth quadrant. This is visualized most conveniently by making a mental picture of the two points and seeing that if the X-coordinate of the first is greater than that of the second, the first point lies to the east of the second, and that if the Y-coordinate of the first is greater than that of the second, the first point lies to the north of the second. Often in the field where Y-north can be visualized, a casual orientation of the gun-target line will make apparent the quadrant in which the point will plot in with respect to the gun position.

Plotting the Point

For convenience and rapid plotting the grid sheet should be ruled off in 100-yard squares, with a heavy line marking every tenth line. Whether or not commercial paper can be used depends upon the scale selected. To plot a point, merely determine the X and Y differences in the coordinates, and (assuming the center to be 0-0) plot these two *differences* in coordinates left or right and up or down according to their algebraic signs.

Example:

Coordinates of point to be plotted:	36.918	—	09.867
Coordinates of gun position:	31.607	—	01.496
	plus 5.311 Yards		plus 8.371 Yards

It is obvious from the above figures that the point lies in the first quadrant. From the origin (pivot point of the chart) measure to the right 5,311 yards and up 8,371 yards. This marks the position of the point in relation to the gun position, and a straight line joining the two will represent correctly both the range and the Y-azimuth of the point as measured at the gun position. Any number of points may be plotted on the chart without affecting the true relationship to each other or to the gun position, as regards either angles or distances, because it is merely assumed that the existing grid lines on the map are lifted and the origin re-centered over the gun position. In other words the "quantities" normally represented by the coordinates of the points are changed, but the "values" remain unchanged.

When high-burst adjustment is used, not only the targets but also the position of the right or left observer can be plotted. The axial observer is always at the gun position, so need not be plotted. Any useful and convenient topographical features (such as mountains, bench marks, aiming points, road intersections, etc.) may be plotted, as well as such military features as OPs, CPs, sector lines, safety limits, etc. A complete firing chart can be built up which may include such items as base points, check points, previous targets, and enemy locations, and preserved for future use.

From any gun position a single chart can be used for any number of targets since usually it is only necessary to plot the target itself without the use of construction lines or lines extended to be measured by means of a range-deflection fan or a protractor. Probably the only construction lines that would ever be necessary would be those used for CI or high-burst adjustment, which can be erased after the adjustment has been completed and corrective data calculated for subsequent firing. If, however, the gun position is changed, one need only erase the previously plotted points or apply a new grid sheet. Where gun positions have been prepared in advance it is practical in some cases to prepare an entire new disk with the grid sheet permanently mounted, on which can be plotted any number of anticipated targets or useful reference points. Thus when the different gun positions (primary and alternate) are occupied during battle, previously prepared firing-charts can quickly be translated into fire commands. In an emergency, one man versed in the operation of the Graphic Computer can, without the delays normally due to tedious calculations and plotting, successfully conduct the fire of a battery.

Use of the Slide Rule

The slide rule which is pivoted at the center or origin of the chart takes the place of range-deflection fan, protractor, straight-edge, and range scale, and also provides a scale for making measurements at right-angle to the line of fire. Since the point of pivot is exactly in line with the top edge of the slide rule, this edge always represents the line of fire. As the rule is moved around the chart the line of fire can be directed at any desired target, and on the several scales around the outside of the chart the various azimuths, base angles, and deflections can be read directly from the chart and translated immediately into fire commands. Since the radius of the gridded sheet can be made equal to the range of the guns, any point that can be plotted is automatically within range of the guns and can be considered a possible target.

To Lay a Battery on Compass Direction

Perhaps the simplest form of problem is when the battery is to be laid on a compass direction or Y-azimuth. To determine the necessary direction so that this information may be passed on to the battery executive for laying the pieces, it is only necessary to plot the point and move the slide rule until the top edge falls on the point. The proper Y-azimuth or compass direction is then read direct from the inner scale—that is, from the scale on the rotating disk.

Base-Point Adjustment

We will assume that the first target is to be the base point, and that adjustment will be made on it for subsequent firing. We will further assume that we have no range or deflection corrections resulting from perivous firing or metro data. With the slide rule in proper position we can read the range to the target directly. This enables us to put the proper charge slide in the rule for that range.

Referring to Fig. 1, it will be noted that the gun-target line

calls for a compass direction of 570‰ and that the range to the target is 9900 yards. For the 105-mm howitzer this calls for the use of Charge VII; the proper slide is put in place with the arrow marked "K" set at zero, because there are as yet no range corrections to be applied. Next, we can read (on the scale marked "Elevation") the elevation that must be put on the guns to reach the target (in this case it is read as 434 mils); with the addition or subtraction of the site, this becomes the quadrant elevation that is sent to the guns. Farther down on the scale will be found the "Drift" correction necessary for that range, which in this case amounts to 7‰ (left correction). Assume site to be plus 10‰.

If the battery has been laid on compass 570, our first commands will be: *Battery Adjust, Shell HE, Charge VII, Fuze Quick, Left 7, No. 1, 1 round, 444*. From this point on the sensings as reported by the observer are figured in the usual way, using *c* and 50/R as shown on the scale until registration has been completed. The net changes in elevation and deflection are used as a basis for figuring K and the deflection correction, as usual. Let us assume that K proved to be minus 40 yards per thousand, and the deflection correction left 8‰.

After this registration on the base-point has been completed, the disk is rotated until the base line coincides with the zero on the outer scale at the top of the chart. This does not affect the position of the target with respect to the guns, but merely orients it with respect to the outer scale for convenience in measuring base deflections. We can also set off the deflection correction of left 8 as found in our adjustment; this will of course apply to all targets within transfer limits, and being automatically applied on the scale it can be forgotten until targets outside transfer limits present themselves. As usual, drift must be applied separately, depending upon the range.

The chart is now in the proper position to transfer to some other target in the area. The new target may have been previously plotted or may be identified with respect to the base-point. This can be plotted readily by means of the sliding indicator and scale on the rule, and the new target plotted. The slide rule is then moved to the new target position and the range noted. This range (in thousands of yards) is then multiplied by the K found in the previous problem, and the resulting figure recorded by setting at the proper place the arrow marked "K." Base deflection is read directly from the scale on the outer ring, using the large figures marked "Base Deflection." This figure plus or minus the drift for the range and plus or minus 50/R (for a 100-yard concentration) as read on the scale, will give the net figure that must be sent to the guns. (When base deflection is left, add the drift correction and subtract 50/R. When base deflection is right, subtract the drift correction and add 50/R.)

We are ready to fire the entire battery one round (opened to the proper sheaf) at the quadrant elevation as indicated—which, of course, consists of the elevation as read on the scale (already corrected for K), plus or minus site. The transfer is complete, and subsequent transfers can be made either by going back to "Base Deflection" or by "zeroing" any check point in the area and reading deflection right or left.

The above method of adjustment on the base point and subsequent transfers is speedy and can be accomplished with few chances for error. Only one point had to be plotted for the adjustment. It was not necessary to use a plane table, protractor, range-deflection fan, straight-edge, separate range scale, or firing tables. A small slip of paper (to figure the differences in coordinates) and a pencil sufficed. Site could have been figured sufficiently accurately on a simple site graph.

In the above problem we considered that the data was from accurate maps or surveys. It is possible, however, to determine the location of the target by the usual "OP—aiming circle—range finder" methods, and building up the firing chart as usual. Even so, once the point is located with respect to the guns (azimuth and range) the procedure described above would follow.

Laying a Battery by Orienting Line and Base Angle

When accurate survey data is available, or when compass readings are rendered inaccurate by proximity to the magnetic pole, it is usually best to lay a battery by orienting line. To do this on the Graphic Computer, it is only necessary to determine the Y-azimuth of (or coordinates of two points on) the orienting line and assume that this line or one parallel to it passes through the gun position. If, for example, the Y-azimuth of the orienting line is 1150‰ we need only turn the rotating disk so that 1150 on the inner scale (the scale on the disk) is "zeroed" at the top of the outer ring. Then no matter where our targets may plot, we can read the base angle directly on the outer scale, using the small figures. This is the base angle that can be used to lay the battery, and by a little study of the chart will be found to be simply the clockwise angle from the target to the orienting line.

After adjustment has been made on the base point, the base line is set at zero as usual and all subsequent targets measured as base deflection right or left.

To Lay a Battery by Aiming Point

To lay a battery by aiming point it is necessary to have the Y-azimuth of the aiming point as measured at the gun position. This in turn can be applied to the chart by turning the disk so that the aiming-point line is "zeroed" and the firing angle measured clock-wise from the target to the aiming point line, using the set of figures marked "base angle"—reading direct if the target is to the left of the aiming point and adding 3200 mils if the target is to the right of the aiming point. After adjustment, the base point can be "zeroed" as usual.

To Adjust by High-Burst Methods

A complete high-burst adjustment can be made on the Graphic Computer, using as auxiliary instruments only a straightedge and a protractor. After the position of OR or OL have been plotted (by subtracting the coordinates of their positions from the coordinates of the gun position), an instrument direction is given them from an aiming point as measured with the protractor. The axial observer is of course at the gun position, and also needs an instrument direction which can be measured with the slide rule and scales provided on the Computer. After the high-burst registration has been completed, the average instrument direction of all rounds is plotted, and the point of apparent center is used as a basis for computing range and deflection corrections as usual.

To Adjust by CI Methods

For a CI adjustment the same method is used as for a high-burst one. except that the center of impact of the rounds is estimated on the ground instead of in the air. After plotting the point of apparent concentration, corrections are figured as above.

Firing a Battalion with One Graphic Computer

The foregoing pages have dealt with firing a battery, at the battery CP or by computers at the battalion FDC. In emergency cases an entire battalion can be fired with a single Graphic Computer by assuming that the center of the chart is the gun position for each battery, and plotting the target in triplicate corresponding to the differences in coordinates between the target and each gun position. OR and OL need be plotted only once, since it is usually convenient to have one battery adjust for all three. From the chart three sets of figures can be read, one set for each battery, and sensings translated into fire commands as usual.

Building Up an Observed Fire Chart

Just as any observed fire chart is built up on a grid sheet or piece of plain paper, the same can be done on the Graphic Computer. A plain sheet of paper is fastened to the disk and, regardless of its azimuth, a gun—target ray is drawn. After registration the base point is plotted in at its proper range as determined from the firing or as a result of figures obtained with a range finder at an OP which also is plotted on the chart. The base line then is turned to "zero" and all subsequent targets plotted with respect to the base point.

Firing from a Map or Air Photo

If an accurate map or air photograph is obtainable, which of course must be of the same scale as the slide rule, either of these can be used in place of the grid sheet. The gun position is located and placed at the center of the disk, and all firing conducted directly from the "Battle Map." A forward observer need only identify a target by template or coordinates, and targets of opportunity can be fired upon as they appear.

HOW TO MAKE IT

The materials we used in constructing our Computer were not those that would be used in a factory-made model, but simply those things that were available in a place that offered a very limited choice. However, with liberal applications of water-proofing materials a computer was constructed that served not only as a demonstration model but as a practical piece of equipment to carry on firing problems.

We used 2 pieces of Masonite, 3/16″ thick and approximately 30″ square (any good impregnated wall-board can be used); a piece of good drawing paper 30″ square; cardboard and drawing paper sufficient to make the slide rule and three slides; one pint of shellac; a pint of clear lacquer; some thinner for the lacquer; salvage celluloid for the scales; and 4 small brass pieces for the pivot and bushings (these latter pieces were turned on a lathe at a local Ordnance shop). Also necessary are plotting and ruling instruments such as would probably be found in any battalion. A few yards of transparent cellulose tape were useful for binding the edges to prevent damage.

Constructing the Plotting Board

The plotting board consists of three pieces: rotating disk, exterior scale, and mounting board. The Graphic Computer described herein is to a scale of 1 : 36,000, but any other convenient scale can be used depending upon the range necessary and the size of chart that can be handled easily. Where a range of over 12,000 yards is necessary, our scale would be convenient; above that range, 1 : 40,000 would be better. If ranges are around 6,000 yards, a scale of 1 : 20,000 can conveniently be used. In figuring the required material it is essential, therefore, that range and scale first be determined.

It is advisable to have the brass pivot and bearings made first, so they can be used in cutting the disk to a true circle without the risk of drilling off-center after the disk has been cut. The dimensions of Fig. 3 can be followed when 3/16″ wallboard is used and when the slide rule is made of approximately 10

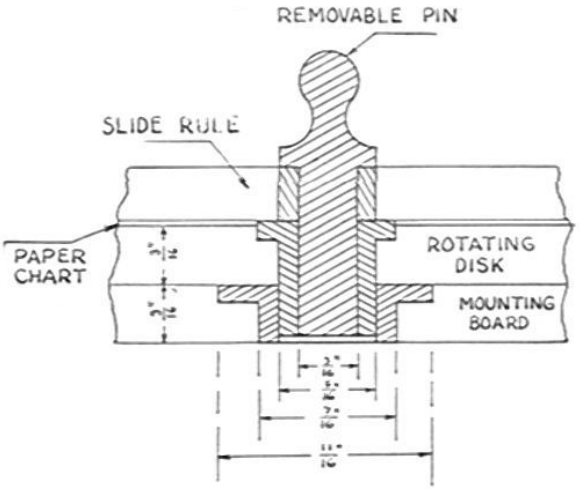


FIG. 3

thicknesses of cardboard. If these dimensions are changed, proper sketches should be made first to insure an accurate fit.

When the above pieces have been obtained, drill a hole at the center of each square piece of wallboard. The center can be located accurately by drawing diagonals, but a slight error in this will not matter because the boards can be trimmed when completed.

Next, place the proper bushing in the board out of which the disk is to be cut. With the pin as a pivot, and using either a piece of string or a strip of cardboard or wood, scribe a circle 13″ in radius. This radius should be approximately ½″ greater than the range of the guns at the scale used, to allow room for an azimuth scale on the chart. A keyhole saw can be used to cut out the circle, or failing that a hacksaw blade, one end of which is wrapped with rags to form a handle. Do not drill a hole to start the saw, but using a very sharp knife (as small a blade as possible) cut a slot along the pencil line no wider than the saw blade and about ½″ long. The board is then cut along the line, being very careful not to deviate from a perfect circle.

When the disk is cut out place it on the mounting board, using the pin as a pivot. The edge can be trued up by holding against it a block of wood around which has been wrapped a piece of fairly coarse sandpaper, while the disk is turned on its pivot. The sanding block should be held firmly to the mounting board so as not to be displaced by slight variations in the radius of the disk. Sanding off the high spots will permit closer adjustment until a smooth surface is obtained. Then paste (not glue) a narrow strip of heavy drawing paper around the edge of the disk. When this is removed later it will provide ample clearance between the disk and the outer ring.

Next cut the outer ring (left over when the disk was cut) into four segments, preferably using a bias cut. These four pieces can then be fitted individually to the disk and fastened in place on top of the mounting board with glue and small brads or screws (if no waterproof glue is obtainable, shellac will do). They should fit snugly to the paper strip around the disk. Then square up and sand the edges of the assembly. Do not as yet remove the paper strip that was pasted to the edge of the disk.

Making the Paper Chart and Scale

On a good plane table or drawing board, scribe a circle with a radius of 13″ on the piece of drawing paper selected for the chart. Mark this line so it can be identified later. Then, inside of this circle scribe seven concentric circles lightly in pencil, four of which are to act as guide lines for the mil divisions (successively longer lines for the 5-, 10-, 50-, and 100-mil divisions), two as guide lines for the numbers for the scale, and the seventh (with a radius of 12½″ and which will be the only one to be put in ink) to mark the edge of the grid sheet.

Outside of the original pencil line, scribe nine concentric circles. The first circle should be as much greater in radius as the thickness of drawing paper that was pasted to the edge of the disk. The chart will eventually be cut along these two lines. The next four are for guide lines for the mil divisions as described above; the final four are for guide lines for the two sets of numbers for the outer scale, with the outer row of numbers larger than the rest. These concentric circles can easily be drawn, even if there is no large compass available, by taking a piece of cardboard, cutting a hole at one end to fit the pivot pin, and using a series of pinholes pricked through at the other end at the proper distance from the center; a sharp pencil (re-sharpened for each line if necessary) can be inserted in each hole in turn and the circles scribed around the center pivot. This method is simple and is accurate if the pinholes are small and the pencil is sharp.

The next step is to lay out with a compass (not a protractor) an accurate, pencilled scale. Two lines at right angles to each other are drawn across the exact center of the chart, forming four quadrants. These right angles can be bisected with the compass and each resulting angle bisected in turn until the 50-mil division lines are drawn. A piece of heavy drawing paper pivoted at the center and scaled to five and ten mils on its free end can be used to mark the remaining divisions. They should be checked and re-checked, and any that appear inaccurate to the eye carefully corrected. They should then be inked in with black India ink, using a strip of heavy cardboard or a straightedge exactly in line with the pivot hole and as fine a hair-line as a sharpened ruling pen will make. Any that are inked inaccurately may be scratched out with a sharp knife or razor blade and re-drawn. After the divisions have been numbered as in Fig. 1, the disk may be gridded to 1000-yard or 1000-meter intervals and subdivided to 100-(units) if desired. The 1000-yard lines can best be inked with black ink, and the subdivisions with red or blue ink.

Mounting the Chart

Give the entire back of the chart two coats of orange shellac, applied evenly and liberally. Similarly coat the top surface of the disk and mounting board. When the shellac is thoroughly dry, cut a hole exactly in the center of the chart to fit the bushing with a slight clearance. Place the chart on top of the disk, face up, and center accurately on the disk. A piece of cardboard pivoted at the center can be marked off on its top edge and used as a measure to make sure that the disk is centered properly. If when turned to four different positions the marks on the cardboard coincide with four corresponding marks in the four quadrants of the chart, the chart is properly centered. Since the shellac surfaces are dry, the chart can easily be slid sideways until adjustment is made. Secure the chart in place with three plotting needles.

The next task is one that should be done only after experimenting with small pieces of similar materials. Press the top surface of the chart with a medium-hot flatiron, allowing the heat to penetrate just enough to soften the shellac on the two surfaces and fuse it together. Too much heat will cause the shellac to penetrate the wallboard too deeply and give an unsatisfactory bond. Too little heat can be remedied by repressing. It is well to dissipate the heat as quickly as possible after the iron has passed over any spot, in order that the shellac may harden quickly; brisk rubbing with the hand following the passage of the iron will suffice. This dry-mount method will work successfully where any wet-process will fail or be difficult to control. The alcohol used as a solvent in the shellac will not distort the paper whereas any glue or paste containing water will cause wrinkles and distortion and will not be entirely waterproof.

When the paper has been bonded to the disk and the shellac thoroughly set (one hour), turn the disk and paper upside down, and with a razor-blade trim as carefully as possible around the paper strip already pasted to the edge of the disk. Then remove the paper strip and trim around the disk a second time. Be sure the blade has no nicks to tear the paper.

After the chart has been carefully cleaned with a soft eraser, cover with one coat of clear lacquer, thinned down somewhat to permit easy application. Also coat the edges of the disk and its back. This must be done evenly and quickly because of the rapid drying qualities of the lacquer. Do not attempt to go back over any part to "touch it up." Although it may look somewhat streaked when wet, it will settle down to an even surface when dry. With care a second coat can be applied. Then rub lightly with crocus cloth or very fine sandpaper, and burnish with a tightly wadded piece of cloth. This will give a durable and smooth surface that will take pencil or ink marks that can be erased without damaging the surface.

Place the disk in position on the mounting board and lay the outer paper ring in position, adjusting and securing it with needles. Repeat the process of pressing it in place as described above and finish in the same manner as the disk. If possible avoid sandpapering the edges of the paper so as not to damage the scale. Both the outer edge of the disk and the inner edge of the mounting board can be covered with transparent cellulose tape reaching slightly over the edge of the paper on the top surface; this provides a good seal for the edges and protects the paper scale.

Making the Slide Rule and Charge Slides

The slide rule is preferably made of such durable materials as wood or celluloid, but it can be made out of successive layers of cardboard which, with liberal applications of clear lacquer, will provide a fairly serviceable rule. Figure 2, a cross-section of the slide rule, shows the recommended construction. The laminations of varying widths are cut from

cardboard previously coated with clear lacquer, using a razor blade held against a steel straightedge. When all pieces have been cut and checked for dimension they can be assembled by applying another coat of lacquer and holding firmly in place until the lacquer has set. A small clearance between the charge slides and the bottom piece of the rule can be provided by cementing a strip of medium-weight paper to the under side of each runner. When the necessary charge slides have been made, all pieces can be sanded lightly with fine sandpaper to fit easily. Talcum powder will act as a good lubricant. When inserting the brass collar to act as a bearing for the pivot pin, be sure that it is exactly in line with the top edge of the scale — that is, the edge that will represent the gun-target line. This can best be done by drilling the hole smaller than necessary and sanding out with a tightly rolled piece of sandpaper or a rat-tail file until a fit is obtained.

Peninsular or island positions especially demand all-around fire from both artillery and smaller weapons.

The transparent celluloid slide (Fig. 2) and the L-shaped scale for the free end of the rule are next prepared and fitted to the rule. A small flat spring fastened inside one of the runners will keep the slide snugly in place as it is moved lengthwise along the rule. The graduations on the transparent slide and L-scale can best be scribed on the under-side and filled with black paint or black ink.

Preparing the Slide Rule Scales

On a piece of smooth white drawing paper lay out at the top a range scale from zero to the maximum range of the guns. This will serve to calibrate all of the charge scales, and can later be applied to the rule as a range scale. Below this lay out a scale for 33/R and 50/R, calculating the values on an ordinary Mannheim slide rule and (for the divisions between consecutive whole numbers) drawing a line at the proper distance as measured down from the range scale.

Below this latter scale lay out the scales for each charge, allowing room for elevation, drift, and *c*. To calibrate the elevation scale, the range corresponding to the elevation for every 10 mils (for each charge) is computed from the range table figures, and a division line is drawn below the same range on the range scale at the top of the sheet. The divisions for each 5 mils of elevation can best be put in by eye. Thus a graduated elevation scale is built up for each charge from any convenient minimum range to the maximum range for that charge. The lines marking the divisions between whole numbers for drift and *c* are next drawn, taking the figures directly from the range table and adjusting by eye in the higher ranges to get a more accurate distribution along the scale (necessary since the figures are only given to whole numbers in the range table).

After inking with very fine lines, the scales may be lacquered, cut apart, and cemented with lacquer to the rule and charge slides already prepared.

A canvas carrying case with a pocket for the slide rule, etc. completes the Graphic Computer.

ATTENTION, INSTRUCTORS!

A senior officer made the following pungent remarks to a mixed, international group of instructors on an island outpost. They are so sound and so universally applicable that we call the attention of all instructors (past, present, and potential) to them.

"To the younger instructors I would say, don't be too bothered if someone in a regimental job happens to rank you for the moment, even though he is junior to you. As an instructor in this school you are exerting an enormous influence over the whole U. S. force on this island. Your job as an instructor here is incomparably more important than any you could fill in doing regimental duty.

"The personal angle should definitely *not* count with you. We all want promotion, we all want action, we all want command of troops; of course we do—that is merely a natural and healthy ambition. But what we must *not* do is waste time and energy in moaning and groaning if we don't get it. We can not afford to waste time, and we are not in this war for what we can get out of it personally.

"I have often had fellows say to me, 'Why don't you go back to Regimental duty?' and '*I* wouldn't have your job for anything.' Wouldn't they, by gad—they would jump at it if they had the chance!

"If you have been thought good enough to be selected to help build the international army, there is nothing much wrong with you, and when eventually you are called upon to take command of troops it will be a good command. What is more, you will be able to take command all that much better because of your work here.

"I say that you are lucky to be chosen to carry the responsibilities which you carry. Try to realize that yourselves."

ARTILLERY on the OFFENSIVE

Written in October, 1942,
by Maj. Gen. F. Samsonov

Russian artillery, like the German, includes a high percentage of horse-drawn equipment. This gunner is laying a piece which appears to be of ancient vintage — apparently a 7.62-cm M.02 gun.

In the first phases of our December, 1941, offensive the Red artillery worked according to the textbooks, applying the teachings of the then current Red Army manuals and the lessons of the last war. Its fire was extremely effective, but the Soviet command considered that the accepted methods were not justifying themselves as fully as had been expected. The enemy's weapons were so effectively protected that it was not enough to silence them—they had to be smashed to atoms.

When the enemy's outer defenses had been pierced the advance became very much more difficult. The usual methods of supporting the infantry by an advancing barrage of fire or by successive fire concentrations became impracticable and did not achieve their purpose. This resulted in interruptions in artillery fire and lack of coordination with the attacking troops. Attacks often failed, or petered out before breaking into the open.

Practical experience suggested new methods, which we have come to describe under the general term "artillery offensive." The essential features are:

Concentration of a superior bulk of artillery on the sector where the attack is planned, borrowing artillery units from neighboring formations.

Maintenance of uninterrupted artillery fire during the whole period of the attack, co-ordinating it with the movement of the attacking troops. In other words, the infantry and tanks attack to the music of the artillery.

In terms of time and space the artillery offensive falls into three phases. The first phase is the preparation for the attack. In the second phase the artillery fire accompanies the infantry and tanks in their attack on the nearest points of the enemy defenses. In the third phase it accompanies them in their attack on the enemy's inner defenses, until these have been completely overwhelmed.

Early Phases

Artillery preparation used to be conceived as a methodical succession of bombardments of limited areas in which targets were located. Every now and again the attackers made a feint at carrying it deeper into the enemy positions. But what happened when we tried this in 1941? At the first signs of the barrage the enemy retired into his dugouts and shelters, leaving in the trenches only observers armed with automatic rifles and light machine guns. This forced us to search for new methods.

Practice has shown that an artillery preparation is most effective when part of the guns (of all calibers up to 203-mm, inclusive) are brought forward to fire over open sights at the embrasures of the enemy's forts and other strongly fortified positions. This method reduces the time necessary for destroying the defense works and enables the infantry to approach the object of attack without loss. It has also been found far more effective and economical than spreading the fire over whole areas, for individual batteries are allotted individual targets.

The second phase of the artillery offensive is relatively brief. It merges with the first and third phases, and it is hard to say exactly where it begins and where it ends. It becomes more clearly defined when an attack fails or is delayed at the outer defenses.

Work Inside Enemy Defenses

The third phase is the most important and complicated. In a war of maneuver, in spite of the existence of a fortified zone the enemy's resistance is mostly based on the manipulation of his forces and weapons within his defenses. Thus in this phase the relative importance of artillery preparation is considerably diminished, while the organization of the battle within the enemy defenses is relatively more significant.

This is contrary to the manuals of many armies and the works of many artillery experts. Basing their views on the experience of 1914-1918, they attach the highest importance to artillery support of the attacking forces within the enemy's defenses, and in most cases consider that this is best achieved by a moving barrage or successive fire concentrations.

The Soviet artillery have tried both these methods, but have found often enough that neither achieves the desired results. In many cases an offensive has to be conducted without an adeouate knowledge of the way the enemy's defenses are actually organized. In particular, it is almost impossible to foresee the moment, the direction, and the strength of his counterattacks. Not infrequently the plan of action of one's own infantry and tanks is changed at the very outset, to suit the changing conditions of battle.

In general, one can hardly ever expect the attack within the enemy's defenses to proceed as planned, but this does not mean that the planning of this phase can be neglected. Here again much has been learned from experience. Escort guns and trench mortar can give valuable support to the infantry and tanks as they advance within the enemy's lines. They advance together with the infantry by short spurts from cover to cover, and must be always ready to open fire. Firing over open sights is a very accurate and economical method, and achieves the desired result literally in a fraction of a second. The adjustment

of aim is also very simple and a matter of seconds.

Because of their smallness these guns and trench mortars are difficult targets to hit. They are attached to rifle companies (and even in some cases to rifle platoons) before the battle begins, and remain with them until it is over. Escort guns are particularly valuable to rifle units operating against junctions in the enemy's formations and on his flanks.

Artillery-Air Cooperation

The selection of the initial objects for attack in the outer defenses is made by the general commanding the troops in consultation with the artillery commander. When these objects have been captured it becomes possible to get a glimpse of the next zone of the enemy's defense. Another method is to send observers to accompany the advancing troops and to direct the batteries to targets interfering with or likely to interfere with the advance.

Experience has shown that it is necessary to have a centralized and easily maneuvered artillery group acting in cooperation with aircraft. Its aim is, by concentrated fire, to prevent the enemy from bringing up large reserves or to compel him to bring them into action in small bodies. The targets of this artillery group are determined by reconnaissance data, and the signal for firing is given either by the aircraft or by the advanced observers.

Such, in general outline, is the "artillery offensive." How effectively the Soviet artillery learned its lessons during the 1941-42 winter campaign may be judged from the fact that the Germans conducted their opening offensive with 175 to 180 divisions, but when they passed to the defensive they were obliged to increase this number to 250.

Stay Put Under Attack

This war has shown that when the artillery holds its ground and fights stubbornly it can always win against tanks. The most dangerous thing an artillery battery can do is to change its position when attacked by tanks or aircraft.

This war has also taught us the importance of defense works protecting artillery positions. We have applied the lesson, and as a result Soviet batteries have suffered very little from enemy artillery fire. Trenches have given excellent protection, even from aircraft.

Bombs have sometimes burst literally within four or five yards of a gun without doing it any harm. Enemy aircraft has proved dangerous to artillery only when the guns are on the march or not properly entrenched.

Tactics of Soviet Antitank Riflemen

By Col. Nagaiev-Maltsev

The antitank rifle is used mainly against armored cars, tanks, and (in exceptional cases, by special order of the command) to silence artillery and machine guns firing either from open positions or from fortified emplacements. Sometimes it is used against planes.

Careful choice of position is the first essential for making the antitank rifleman's fire effective. He should always be placed so that he dominates an area over which he can maintain effective fire at maximum range—400 yards—in all directions. It is a good idea to choose a position behind antitank obstacles so the rifleman can hold his prey under flank fire. There should be no outstanding objects near his firing position, nor any dead spaces in his zone of fire.

Experience on the Soviet front has taught us that the best position for an antitank rifle is the edge of a gully or ravine, in the shelter of felled trees or among low bushes, on the slopes of hills, among the ruins of houses, or on the edge of groves and gardens. A position on the forward side of a steep rise is useful, as it allows the rifleman to aim at the rear of enemy tanks as they slowly climb the hill. A position on the far side also has its advantages, as there the rifleman is beyond the enemy's observation and is therefore less vulnerable to his artillery and mine-throwers. Attacking tanks are an easy target the moment they come over the crest of a hill; their crews, surprised by the antitank rifleman's fire, cannot at once trace the source of the fire.

But wherever the antitank riflemen are operating, they must not sit down and wait for the tanks. They have to go and look for their victims, get to close quarters, and put them out of action with surprise fire from flanks and rear.

In trench fighting, where enemy machines manage to smash their way forward, the antitank riflemen should hug the bottom of their trench, allow the tanks to pass overhead, and then open fire on them from behind. The crew of a disabled or burning tank may attempt to escape or show fight, taking cover behind their machine. In such a case antitank riflemen need the support of automatic riflemen and sharpshooters.

In defensive tactics the place of the antitank riflemen is in the direction of possible tank attacks; it is their job to destroy the enemy machines at the first defense

line. In such cases the riflemen are not scattered singly all along the line, but are concentrated in separate groups. Similar groupings of antitank riflemen cover the second and third defense lines, and are placed inside or between the antitank artillery positions.

Cooperation between the groups is of great importance. The distance between them should therefore never exceed 200 yards. In a defensive action the commander of a regiment or battalion usually has an antitank reserve which can be moved

readily to the flank; its work can be of great assistance in regaining lost ground. Simultaneously, a mobile reserve group of antitank artillery must act from the front. If the shock group of a regiment or the second echelon of a battalion are to take part in an action, antitank rifle reserves must be moved to the line of departure in good time.

With that object in view, all officers of the reserve are kept informed about the disposition of antitank defenses, the probable direction of enemy attacks, the direction of counterattacks by our shock groups, and the firing positions of the mobile reserve antitank artillery.

In a defensive action, cooperation with other antitank weapons is usually planned as follows:

Groups of men armed with hand-grenades and fire-bottles take up concealed positions in front and on the flanks of the antitank rifle group, but no further than 100 yards from it. Engineers with mines are stationed in front and on the flanks of the firing position, while sharpshooters detailed by the defending rifle units for the destruction of crews of damaged enemy tanks and enemy automatic riflemen take up positions at their discretion. The men with hand-grenades and fire-bottles support the antitank detachment against any of the enemy who manage to filter through to close quarters, the antitank rifles in turn defend the positions of the antitank artillery.

When on security duty in battle, the antitank rifles take up positions across the probable ways of approach of enemy tanks, or along the sides of roads. Their task is to prevent enemy armored cars and tanks from breaking through to our first line of defense. The enemy vanguard is allowed to advance beyond the firing positions so it can be destroyed by fire from behind. Then the rest are dealt with.

Before an advance begins, the armor-piercers cover the movement of the infantry to their starting positions. Subsequently they move forward on the flanks of the infantry from one objective to another. Their method of advance may be by crawling or by dashes forward—it depends on the terrain and the intensity of enemy fire. Commanders unceasingly seek hidden routes for the next forward movements.

In offensive actions the situation is constantly and rapidly changing. Enemy tanks may launch surprise attacks from cover. Ambushes are frequent. It is therefore of the utmost importance that the antitank rifle detachments should be always on their toes. Those who are fighting in the advance echelons move on the flanks of the infantry in battle formation, shoulder to shoulder with them. If for some reason the infantry is delayed, antitank riflemen immediately take up firing positions and prepare for battle. They dig in, camouflaging their movements as they do so. They cover the starting positions, keeping the enemy's front defense line under careful observation, looking for dug-in tanks and destroying them as soon as they spot them. As the attacking infantry break through the enemy lines the armor-piercers quickly catch up and begin immediately to prepare to repel possible counterattacks by enemy tanks.

When they reach the depth of the enemy defense the main job of the antitank rifles is to destroy counterattacking tanks. The armor-piercers maintain their steady advance on the flanks of the infantry's battle formations in the direction of possible tank attacks, and take up suitable firing positions.

As soon as an enemy defense position—perhaps a height or a village—has been captured, the armor-piercers at once move forward to organize the antitank defense and take up their positions in the direction of possible danger. The remainder of the antitank rifle units stay behind to protect the infantry against counterattacks by enemy tanks and to destroy panzers that may be attempting to cover the retreat of their rearguards.

TRAINING FILMS

The following training films of interest to artillerymen have recently been released:

4-2011—Care and Maintenance of the 155-mm Gun, Part XVII—Maintenance of the Carriage and Limber, 155-mm Gun, M1
7-1140—Antitank Grenades
7-1161—Street Fighting
17-1160—Recognition of AFV—Covenanter and Crusader
31-1175—Field Artillery 105-mm Howitzer Section in Shore-to-Shore Operations

ANTITANK TRAINING

By A British Army Artillery Officer

"The essence of antitank artillery tactics is surprise action from well concealed positions at effective range." In short, an *ambush*.

(a) The guns must be concealed and camouflaged, and the detachment trained not to give the position away by careless movement.

(b) Chief of Section and gunner must be trained not to open fire, thus giving away their positions, until they are certain of hitting the tank *first shot* whenever practicable; of hitting the tank in a *vulnerable spot;* of a *distribution* of fire, which admits of letting the leading tank enter well into the gun's zone of fire in order that, if the opening shot misses, the tank cannot dive for cover of a hull-down position before 2 or 3 more shots can be fired at it in the open.

These points must be rubbed into all ranks from the start, for it must be remembered that officers will seldom be at hand in the field and success or failure is up to the detachment of each gun.

Tanks do not work singly, but in groups of 3 or more, often mixed types. Once the gun opens fire its pronounced flash will quickly give away its position and surprise will be lost. Therefore the quicker the leading or most dangerous tank is disposed of, the sooner can the remainder be engaged.

By holding fire until the tank is within 600 yards or less a hit with the first shot should be assured, but ill-judged lead or range, or other reasons, may cause a miss. Therefore the quicker the layer can fire an accurately laid 2nd or 3rd round, the better from the point of view of both survival and ability to deal with the other tanks.

British sub-caliber AT practice with the 6-pdr. (57-mm) is carried on with a Bren machine gun perched on the tube. Its effectiveness is shown by . . . .

Hence it will be seen that layers must be trained to shoot consistently and accurately, at as fast a rate as the circumstances demand. This must be emphasized because rapid fire in itself is no criterion of a good layer or of a successful shoot; the ability to *maintain a fast rate of accurately aimed* shots is. Rapid fire therefore should be discouraged from the start, as such, and accuracy and consistency insisted on in every case. The minimum standard should be 50 per cent hits.

The Chief of Section

Chief of Section is to the antitank gun detachment what eyes and brains are to the rifleman. He is responsible for the correct handling of the gun and detachment so that enemy tanks will be destroyed with a minimum of rounds.

His first duty on seeing a tank is to decide whether it is enemy or friend. In North Africa this was often quite difficult, owing to dust and glare, especially as British tanks have been used by the enemy to lead a group of tanks. It is essential, therefore, to examine the tanks as they appear, should there be more than one, so that differences may be noted. If enemy, Chief of Section gives the order to engage, and the order *Fire* when the tank has reached a point within effective range of his gun.

Should the first round miss, he must immediately correct by making an alteration to lead or range. (The gunner must never alter either range, lead, or his point of aim without orders from his section chief.) His object is to *hit* the tank *quickly*.

It is essential to select the correct type of Chief of Section—with a quick eye, a stout heart, and plenty of common sense. His training should include:

a. Thorough instruction in the equipment in use, and its maintenance in the field.

b. Practical instruction in care and maintenance of motor transport.

c. Course in tank recognition.

d. Tanks, their vulnerable points, their tactics, etc.—by lectures, films, diagrams, and mock battles staged by a tank unit in a previously selected area where the AT guns have been sited.

e. Judging distance, speed, and the application of correct lead. These points can be mastered only by practice, and a selected course should be used with a truck or "mock-up tank" target on which section chiefs can be exercised about once a week. This subject is perhaps most important of all.

f. Miniature range to bring out a quick and correct reaction to the fall of shot. Constant practice is the keynote.

g. Lectures and practical work on concealment and camouflage. Other members of the crew need similar instruction. In addition, the gunner needs special training in leading and swinging.

Crew Training

Battery (battalion) gun drill should be run with a simple tactical setting to maintain interest. Short moves are desirable, and guns may be sited within 100 yds. of each other, if convenient. Have critiques for each gun, and *make gun detachments*

. . . . results like this, wherein a battery of 6-pdrs. knocked out 3 of the newly modified Pz. Kw. Ills in short order. The Nazis have been mounting larger caliber guns with higher muzzle velocities on most tank models; this combination makes it imperative that our AT guns NOT open fire (or otherwise disclose themselves) prematurely.

criticize the position of other guns. Points to be brought out in this form of training are march discipline, camouflage, occupation, track plan, range cards, MG siting, general layout of equipment, slit trench, gun pit, etc.

TRAINING IN JUDGING SPEED AND DISTANCE

Requirements

a. An open piece of ground 400 X 500 yds., which can be seen from varying distances up to 800 yds.

b. A vehicle, which should be the same size as a tank or carry a scale silhouette, with speedometer and steady driver.

c. A radio set on the vehicle or at the driver's starting point, and another at the instructor's view point—control is of assistance.

Method

The driver is ordered to drive at known speeds (say 15, 20, and 30 m.p.h.) for 400 yds. and to return to his starting point at the same speeds.

Chiefs of Section are taken to a view point at a known distance from the vehicle, and are told to estimate *range and lead* (not speed) on the outward journey. The instructor knows the correct answer, which is given to the section chiefs after the outward journey. They watch the return trip.

The view point is changed (it may be at any angle to the run of the vehicle) and the exercise is repeated.

Note: Speed of the vehicle by itself does not matter to the section chief. He wants to know the *lead,* and this depends on both the angle of approach and the speed.

COOPERATION

The goal is complete confidence between the gunner and his Chief of Sections. By constant subcaliber practice this will be obtained, as well as smooth co-ordination throughout the gun crew. Constant subcaliber practice greatly increases the percentage of hits when full caliber ammunition is used.

For subcaliber practice the crew should wear coveralls. Only when a standard of 70 per cent hits has been reached should service practice in "full field" be carried out as a test.

ANTITANK

By A British Artillery Officer

1. The Prelude.

In the British Service some bitter lessons have been learned in the last 3½ years on the subjects of Tank and Antitank Gunnery. All along people had recognized the necessity for special training, but when it came to actual close combat it became very clear that "Twice armed is he who gets his blow in first" and that speed and deadly accuracy were necessary. When people began to realize what a potent weapon they had in a flat trajectory quick firing gun they became perturbed about the lack of accuracy they were getting in the shooting. More serious and constant training were required.

Six-pounders now are standard armament of British Crusader *tanks. In Tunisia, as elsewhere, crewmen never strayed far from their vehicles. A touch of home is added to the interior, each man painting his own corner his favorite color!*

Modern tank tactics have developed the A/Tk defense so that the latter when skilfully concealed, calmly commanded, and accurately served, is deadly to the tank. In open country two general types of engagement always occur, though infinite variations will be found.

2. The Picture.

First. The approach cautious. You are the approaching tank commander. You see an enemy convoy halted. Is this soft skinned prey to be pounced on? Is there something phoney? The transport doesn't move—that looks like something dug-in. A cautious approach is indicated. You reduce speed and every tank commander is straining his eyes through glasses to try and pick out the A/Tk guns he believes to be there. Slowly the tanks maneuver in. . . .

You are the A/Tk Battery Commander. Your little task force is to halt for the night. You have the same weary job. In a flash you must decide where your guns are to go, and tie up with the infantry and the few tanks in the column as to where they can best deploy. Once you have decided you must place your guns and they must dig, dig, and dig. Dig and cover . . . and all ready before anyone can have time to see you doing it. Barely is this job done (with little time to take ranges and allot sectors) when enemy tanks appear. Yes, about thirty of them, you reckon.

Then the fun starts. They are obviously suspicious. A troop starts edging its way cautiously in towards your guns. Your 12 guns are well spaced, and four of these ought to be able to take care of that sector. On the right towards your rear now another troop is edging in. You can see the game. They are trying to draw your fire prematurely so the rest can rush in unharmed. You thought so! As you peer through your glasses you can see two—no, three—no five!—turrets oozing into position behind those rocks, that scrub, and the sandhill. If one of your guns opens fire too soon the ball will open, the others are sure to disclose themselves, and then there will be at least 15 enemy guns on your boys and still 15 enemy tanks

free to get busy. You see one, then six tanks in among your positions. Now the anxiety is the other way—will they never open up? Suddenly a tank swings violently round to escape and brings its gun round to fire. But your boys have him. One shot . . . one tank! The others open up—oh, nice work! *And* some bright lads have got the measure of two hull-downers too!

Second. The approach in bulk. You have advanced and taken your objective—and a bit more. Now you have to reorganize for the next phase.

First of all your antitank layout must be made immediately effective. You command an infantry battalion and all your available means must be immediately put into action. Your own six guns and the attached A/Tk Battery with their 12 are all you have at your disposal, plus a comparatively few mines. Your Battery Commander has done this with you before and you let him have a free hand. Quickly he re-sites the ground layout with a view to defilade, crossfires, and concealment. He gives his orders, has to shift one company's disposition a bit to fit the plan and back he comes to tell you what he's done. It's getting dusk but the gun crews know that their success depends on quick action and they dig and dig as though possessed. In an incredibly short time there is little sign of the 6-pdrs: they have all sunk into the ground, the spoil has been dispersed and the nets are up. Just as well.

Bren-gun carriers are seldom pictured with their machine guns in action. These vehicles are symbolic, however, of a new type of infantry—they lack the protection and heavy fire power of a tank, yet fight from armored vehicles; although not on foot, they have many of the attributes of old-style doughboys. A cross between infantry and cavalry, they might be called raiders de luxe: *fast and with a wide radius of action, they are useful against enemy infantry and lines of communication.*

Light tanks appear. Just a few—and a tempting target, too. But the gunners know this maneuver now. Those fellows are just trying to find them so that they can be killed off before the inevitable counterattack comes in. The tanks have no luck—since nobody opens up.

Apparently the enemy cannot wait, and more dust and noise shows the bigger fellows are on the move. Here they come. Three round that hillock to the right. Watch them. But not too much, for here come five more on the left. Now they are in full swing. Supporting fires have opened trying to neutralize your area. More and more come on. They are going to make a determined rush for it. The leading ranges close—1,200, 1,000, 800. You know that by your markers and range cards. Still the gunners hold their fire.

There are 30 of them now rolling on. The leading waves which seem coming in every direction are now down to 600. That's where the "engage line" was fixed. Now the itching fingers start, and with a crack and a roar the guns open up. Three tanks stop and two start burning. But more come on and now the flash of the antitank guns is answered by streams of bullets from the tanks. As they loom up more are knocked out—but so are three of the guns. Yet steadily each *gun left is* obviously keeping its eyes skinned with a steady nerve and no tank comes through without attention. Then the enemy wavers. He goes back to lick his wounds and make a fresh plan. But 12 smoking hulls are left behind.

Something nasty is going to happen again. So ammunition has to be replenished. Some guns can be pulled out into alternative positions, and in the night more preparations made to meet the next attack with the 12 guns remaining of the 18.

Comes the dawn and with it more feelers to your flanks and rear. Last night's gun positions are bumped heavily. And when the reinforced attack comes in you have a bigger task with fewer guns. Every shot must count—and count they do. After two more tries in which he loses 10 more tanks and you lose two more guns the enemy gives up. Just as well, since ammunition and detachments are running low. And so the next Infantry Battalion can take up the battle and plunge ahead while you collect yourself for the next hop. "Enemy counter-attacks were repulsed."

3. The Motto.

This is a different tale to what it used to be when guns went into action sited for ease of control rather than to catch the enemy, and when they were not dug in and perished without firing a shot. Sometimes fire in those days was opened at too long ranges and retaliation came before a hit could be got on the tanks. Sometimes too, fires were crossed and tanks came around unnoticed till too late.

Experience—the hard way—and constant unremitting training in detailed progressive steps have produced new results in the 8th Army. It's a hard life with few let-ups and calls for perfect fitness, steady nerves, alertness, teamwork of the highest order, and rigid discipline. Perfect drill which is second nature ensures that not a second is lost. Complete knowledge of the equipment and how to get the best out of it have to be absorbed, and recognition of the various types of tanks has to be perfected. Instantaneous response to every problem then becomes second nature to officers and men alike. And the German knows it.

ROUTES INTO EUROPE

A Study in Terrain

PART III—THE AEGEAN AREA

By Col. Conrad H. Lanza

The Aegean Sea is the water approach for an invasion of east Greece, or of the Balkans through Macedonia and Thrace, or to Istanbul and the Black Sea. At date of writing the eastern shore of Asia Minor and the entrance to Istanbul through the Dardanelles are held by Turkey, a state which has so far remained neutral in the present war. The north and west shores and all the numerous islands in the Sea are in the possession of the Axis, nearly all of this being seized territory inhabited by peoples hostile to the occupying forces.

At its south entrance the Aegean is 270 miles wide, and its depth to the north shores is 425 miles. Distances from Allied bases are:

From—	
Africa	**215 miles to beach; 250 miles to airfields; and 300 miles to Bengazi and 325 miles to Alexandria, the nearest bases.**
Cyprus	**270 miles.**
Malta	**500 miles.**

In general the Aegean Sea is relatively shallow, and large parts of it can be mined. Exceptions are north of Krete (with depths of over 1,000 fathoms) and in the north part (where depths reach 600 fathoms). Elsewhere there are large areas not exceeding 100 fathoms in depth.

The Aegean is noted for incredibly swift changes of weather. Within a matter of but a few minutes a sudden change of wind may change a smooth sea into a remarkably rough one. Consequently, notwithstanding the many available ports and harbors, navigation for small vessels is at times dangerous. Large ships would not be inconvenienced, but barges and small craft needed for landing operations might be unexpectedly prevented from continuing planned operations.

Most of the Aegean's 483 islands rise from submerged mountain chains which are prolongations of ranges in Greece or in Asia Minor. Many of them form belts across the Aegean, with comparatively shallow water between them. They vary greatly in size. These islands are usually mountainous, and have a profusion of harbors. They are generally fertile, and

the majority are inhabited by members of the Greek race speaking that language or some dialect of it. Some of them are volcanic, and all are subject to earthquakes which may be of destructive and (occasionally but rarely) of catastrophic extent.

In order from south to north the main island belts are:

1. *Outer belt* from the south tip of Greece, through Kythera, Antikythera, Krete, and Scarpanto to Rhodes.
2. *Volcano belt* extends through Melos, Kimolos, Thera (or Santorin), and Nisiro (or Nisiros).
3. *Central belt* (an extension from the mountains of Thessaly), through Evvoia, Andros, Tenos, Mykonos, Ikaria, and Samos.
4. *Inner belt* through Skyros and shallow banks to Psara and on to Khios.

Inside the inner belt are a number of *detached islands,* some of which have considerable military importance.

Although these islands are largely peopled by Greeks, some never have belonged to Greece and others have been under Greek control for only a short time. After the fall of the Roman Empire (eastern section) the Aegean Islands fell partly under Venetian jurisdiction, the Venetians having been invited in as a protecting military force against the Mohammedan invasion. In course of time the Turks gradually ousted the Venetians. When Greece obtained her independence in the last century, she secured roughly the west half of the Aegean Islands. The Italians took the Dodecanese Islands directly from the Turks in 1912, and these islands never have been under Greek control. In 1919 the eastern Aegean islands were taken from Turkey and assigned to Greece.

As a result of these political changes the islands usually have Italian and Turkish names in addition to their Greek one, and the same is true for towns and other geographical features. Any or all of these types of names appear on maps. In this paper the Greek names are generally used, with reference to other names when these are in common use. Due to the conditions indicated, Italian and Turkish minorities remain in some of the islands, and their customs and laws materially affect current economic and social conditions.

The main Axis base in the Aegean is at *Lero*, or Leros. This island is in the northern part of the Dodecanese off the coast of Asia Minor, and is not connected with any of the belts. It is a small, mountainous island, about 10 miles from north to south and about half that width, with a very irregular outline. On its west side is the finest harbor in the Aegean, on which are bases for naval forces (including submarines). There are several large airdromes. A considerable portion of the shore is precipitous, and no part is very favorable for landing parties. Strong batteries protect the coast, some being located inside the cliffs. Experience in the preceding war in Istria (where the Austrians had similar batteries) indicates that this type is hard to reduce, requiring direct hits on embrasures. Lero is very fertile, and raises considerable food. Nevertheless it is not self-supporting, and food has to be imported for the inhabitants.

This condition as to food is general throughout the Aegean. In case of occupation by Allied forces, provision must be made for feeding the inhabitants.

OUTER BELT OF ISLANDS

Krete (often spelled Crete or [on Italian based maps] Candia) is the largest island in the Aegean, closes the center of the south Aegean boundary, and is the main Axis center of resistance to an invasion through the Aegean. It is an important air base, supports light naval forces, and has a large garrison. Its geographical features are favorable for a stubborn defense. Its west extremity is within 60 miles of Greece, and its eastern end within 110 miles of Asia Minor; both these intervals are partially closed by other islands of the outer belt. It would be difficult for any sea expedition to by-pass Krete, as from its air fields and naval base ships could be easily attacked by air and light naval forces. The capture of Krete is a preliminary operation to any important invasion of the Aegean area.

Krete is the third largest island in the Mediterranean, being surpassed in size only by Sardinia and Sicily; but it is considerably smaller than these two, having an area of only some 3,350 square miles as against about 10,000 for the Italian islands. Krete is nearly the same size as Corsica, but differs in shape. Its length is 160 miles from west to east; its width varies from 7½ to 35 miles.

The island is very mountainous. Dark limestone predominates. As is usual in limestone areas, caves are numerous and extensive. Incidentally, they afford excellent sites for CPs, dumps, and similar installations.

Krete's mountains are divided into groups. Starting at the west are the White Mountains, also known as the Madaras Mountains. They cover the west third of the island, extending to the vicinity of Rethymne (or Retimo) on the north coast. Some summits exceed 8,100 feet. On the south mountains rise straight up from the sea, affording no practicable landing spaces. On the north side spurs run northward from the main ridge, extending into peninsulas which separate the north coast into bays. If landings are made on the north side, any advance toward either east or west will encounter good defensive positions on these ridges. The White Mountains are the only ones whose ridges run north and south; in all other ranges they run east and west.

Next toward the east come the Psiloriti Mountains, whose peaks also reach 8,100 feet. They are joined to the White Mountains by the Retimo Pass, with an altitude of 3,000 feet; the island here is about 14 miles wide. The bay on the south side—Plaka Bay—is suitable for landing only small parties. These mountains cover nearly a fourth of the length of the island, extending to opposite Herakleion where there is another saddle or pass to the south side of the island, here 23 miles wide.

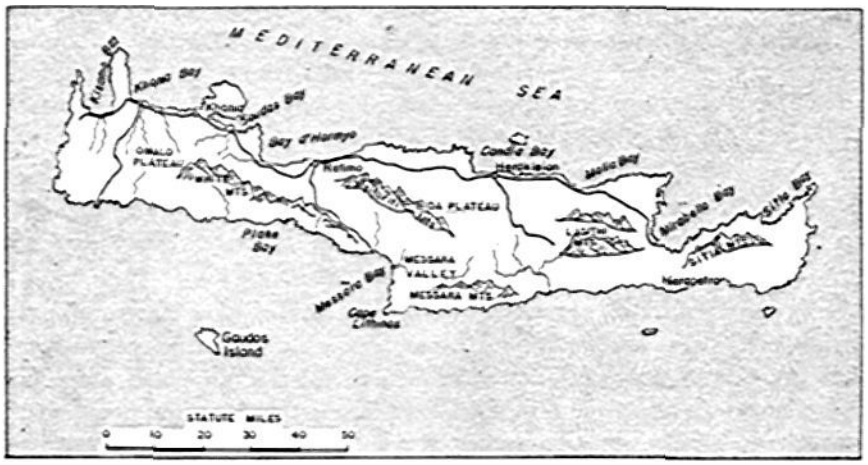
The Lasithi Mountains extend from this saddle eastward to Mirabello Bay, with summits over 7,100 feet. Beyond a last saddle at this location rise the Sitia Mountains, which do not exceed 4,850 feet. In the center of the south side of the island are the Messará Mountains, which are detached from the main chain and whose heights are not over 3,900 feet.

Except for three summer months the higher mountains are snow covered. All the mountains are rugged and constitute first rate obstacles. Small streams extend down to the coast, and usually pass through precipitous, narrow ravines; these are so deep that in some of them sunlight never reaches the bottom. As a rule the mountains are bare, but a few minor forests exist. All the mountains are famed for their caves, some of which are very large. In the past these afforded shelters to refugees from justice, to bandits, and to guerrillas. Today

they are ready-made military shelters for personnel and materiel.

A peculiar feature of the mountains are the extensive plateaus at high altitudes. At the west is the Omalo (or Homalo) Plateau, 20 miles long at a 4,000-foot altitude, right in the center of the White Mountains. In the Psiloriti and Lasithi Mountains are similar plateaus named respectively Nida and Lasithi, at 5,500 feet and 3,000 feet. Lasithi Plateau has a few villages, the others none. All plateaus are summer pasture grounds, quite level and open for military operations. They are drained by subterranean streams.

These plateaus at once suggest the possibility of dropping parachute troops thereon. This would seem to be quite



practicable, as the great size of the plateaus makes it impossible for the enemy (with the size of garrison he probably has) to occupy all of them throughout. Exits from the plateaus are restricted to the narrow canyons mentioned above, along which only small parties could advance. Parachutists, and troops subsequently debarked from transport planes on the plateau, must count on being supplied with all needed supplies by air until a base near the sea has been secured. The only supplies on the plateau are flocks of sheep during the grazing season, and these might be removed by the enemy before they could be seized.

Two-thirds of Krete, including the mountain areas, are a bare, stony waste. Rains are heavy in late autumn and in winter. The water drains off rapidly, appearing in the canyons as torrential streams which temporarily are serious obstacles. At one time the island was famous for its cypress and cedar forests, but these have disappeared except for a few inaccessible mountain areas not likely to be involved in military operations.

Arable land is found on the south coast in the Messará valley; on the north coast around the Bay of Kisamo, Khania (better known as Canea), Rethymne (or Retimo), and Herakleion; and near Hierapetra on the southeast coast. On the south side near the center of the island is the Bay of Messará, into which drains the Hieropotamo River, which runs from east to west for 20 miles in an air line. The valley is 5 to 15 miles wide, fertile, with several villages, and so far as space is concerned would be suitable for assembling troops. There is no harbor for debarking and usually there is a heavy surf in the bay, but landing is practicable provided the wind is not from the south nor the weather stormy. The natives do not bring boats to the shore; they wade out and carry supplies between boats and shore. Troops landed in this valley would find themselves hemmed in on all sides by difficult mountains with narrow passes. The other cultivated areas are relatively small, the largest being around Khania.

The main life of Krete is along the north shore, where good motor roads extend the full length of the island. Population is about 350,000 (no recent census), of which about 10% are Greek Mohammedans.

Khania is the capital. Its Italian name is Canea, and it is Italian built, including an old Venetian fort of no present military value. The port is small, but has a good stone quay, suitable for debarking troops. A mole protects landing boats but not large ships—they must remain outside. The population is about 14,000.

Across a ridge extending northward from the White Mountains, and less than 5 miles away to the east, is Soudas Bay (often called Suda Bay, which is the Italian name). There is a small town of the same name on the south side of the bay, which also has a small port and a stone quay.

Rethymne (Italian name: Retimo) is a town of about 10,000 people on an open roadstead.

The largest town or city on the island is Herakleion, at about the center of the north side. Its Italian name is Candia, but it appears on some maps as Megalokastron. This too has a small port with good stone quays. A harbor railroad extends 3 miles inland to quarries—the only railroad in Krete. The population numbers 40,000. The city is encircled by an unusually well preserved series of fortifications erected by the Venetians in the Middle Ages; their present military value is limited to local defense only.

There are numerous small villages all along northern Krete. In general they are located inland, due to one-time fear of raids by hostile Mohammedans.

The arable part of Krete is well cultivated, there being a profusion of semi-tropical and temperate fruits, including oranges, lemons, olives, pears, and apples. These are normally articles of export. Cotton and tobacco used to be raised in small quantities. Cotton thrives well, and as the Axis is understood to be short of cotton it is possible that its cultivation has been increased since the Axis occupation in 1941.

Copper and zinc are known to exist on Krete, and it is probable that other minerals can be located. No mines were in commercial production prior to 1941.

Sheep abound on the island. Mules of a superior quality are raised.

The economic value of Krete to the Axis, as it was in 1941, would not be important. The capabilities of exploiting resources are considerable, and by now the island may be of value to the enemy, producing copper, cotton, wool, and fruits. On account of air raids by the Allies from their bases in Africa, Axis commerce with Krete is largely carried on in caiques and other sailing craft, which travel from island to island largely by night; from its numerous air bases in the Aegean the Axis protects these small boats as best it can.

Areas or beaches suitable for debarking an expeditionary

force, are limited. On the south side there are no ports and but a few small harbors. The best is in Messará Bay, which has already been mentioned. Going around the south end of this bay past Cape Lithinos and thence east, 5 miles beyond the cape is a practicable landing beach provided the weather is suitable. This bay (known as Kali-Limenes) is reputed to be a haven even in some kinds of bad weather; it is here that St. Paul is supposed to have taken refuge during a storm. All places on the south coast are impracticable for landing small boats during swells, which may occur even during otherwise good weather.

The north side is considerably indented and has several harbors suitable for landings. Near the west end is Kisamos (Kisamo) Bay. This bay affords ships protection from the weather, but they would be under fire from artillery on both sides and subject to air attack. There are no important objectives in the vicinity, and routes leading to other parts of the island can be blocked by good defensive positions on mountain ridges.

Next comes the Bay of Khania. On account of its size, ships would meet artillery fire only from the front. The peninsulas on the flanks, while not impregnable, do not lend themselves to landing attempts. Landings made at night against the head of the bay would have a chance of success. As this bay is entirely open to the north, the sea is at times extremely rough and quite unsuitable for landing operations.

Just east of Khania Bay is Soudas Bay. This is a fine harbor, with complete protection from sea and wind. It may be used by ships of any size. Its water area exceeds 8 square miles, so there is room for entire fleets. No port has been developed on this bay, but it is practicable to land at numerous places on the south side.

The use of Soudas Bay as a debarkation area can not be counted upon as long as the enemy holds the nearby high ground from which he can direct artillery fire. It may be necessary to land elsewhere, either east or west, and then proceed to clear the shores of Soudas Bay to enable transports to enter it with comparative safety. A landing in the Bay of Khania followed by land and air operations, would appear logical. It might be supplemented by a secondary landing east of the bay. This area was the center of activity in the campaign of 1941. The enemy seized the bay from British troops, primarily by use of air-borne troops and parachutists landed on nearby air fields or dropped in the vicinity. It will not be so easy to repeat this operation, as the airfields are now closely guarded—which they were not when the initial German attack occurred.

East of Soudas Bay is the Bay d'Harmyro, which affords minor possibilities for landing. The city of Rethymne is on the sea, without a harbor. Landings can be made along the coast east of Soudas, provided the sea is not too rough.

The bay of Herakleion (or Candia) is the next best debarkation area after Soudas. There is partial protection for ships in this area, and the largest city on the island is at hand. The Bay of Malia further east is entirely open, but in good weather can be used. At the east end of the island is the Bay of Mirabello, which is partially protected. This is also true of the Bay of Sitia, the last bay on the north side. Landings made at these two bays are distant from worthwhile objectives, which could be reached only by land operations over the difficult mountains which hem in these bays.

While there are numerous places on the north side of Krete where landings are practicable, Soudas Bay is the only one where troops and supplies can be debarked safely and rapidly without regard to weather. An expeditionary force sent around Krete to the north side will be exposed to air and submarine attacks from enemy forces based on Aegean Islands further north, but this risk can be taken care of by suitable air and naval dispositions.

As of 1 June 1943 the enemy is understood to have a

This view of Khania's harbor gives a good idea of Krete's general ruggedness.

garrison in Krete of one corps of two divisions, plus special troops. All are German and are reported to have received a special training in guerrilla warfare. The special troops include artillery to defend the bays and the airfields against naval and air attacks. The enemy's air forces in Krete have varied. At times there have been large air forces present, at other periods the air force has been weak. There is always a considerable observation force, charged with observing the entire eastern end of the Mediterranean. It must be presumed that an accumulation of transports, landing barges, and naval forces in Cyprus, the Levant, or in north Africa would be discovered by the enemy in time for him to alert his troops and bring in additional air forces, which might be based on other islands.

Due to short distances from Krete to Greece and other enemy-held islands, the enemy (if he has use of the air) can reinforce and supply his troops by air as necessary. In the two years he has occupied the island there has been time to prepare appropriate defensive plans, provide artillery and other materiel, and construct air fields. His principal air base is probably near Herakleion. Indications are that the enemy intends to make a strenuous defense of Krete, as the base of the defense of the Aegean ara.

The island's configuration and position are such that parachute and airborne troops are indicated as an indispensable aid to landings. Landings on the south coast do not promise much success, as (aside from the technical difficulties of debarking) all objectives are across high and difficult mountain ranges which would involve protracted operations under conditions more favorable to the enemy. Landings on the north coast will reach the enemy's main forces, airfields, and depots at once, and promise maximum gains. They are therefore

likely to be strongly contested, for if the enemy loses the north coast he can not hold out for long. The road system favors the enemy's movements laterally along the north coast, but as the roads are nowhere more than a few miles from the sea, a short penetration inland would cut them.

Rhodes (Rhodos in Greek) is the Axis second main center of resistance along the outer belt of Aegean islands. It lies at the extreme east end, being ten miles south of Cape Alepo in Asia Minor and 90 miles northeast of Krete, this latter interval having intervening islands.

Rhodes is 45 miles long from southwest to northeast, and 22 miles wide in the center. Its general shape is an ellipse. It has an area of 424 square miles, and a population of 140,000. The coast is quite indented, measuring 250 miles in length.

This island is the summit of an underwater mountain range, with extremely steep submarine slopes east of the island to the deepest spot in the Mediterranean (25 miles east of Rhodes) where the depth is 12,500 feet. The water is so deep on this side of the island that it cannot be mined. Due to lack of submarine vegetation there are almost no fish.

Slopes on Rhodes are gentler than on Krete, and the island is extensively cultivated; 4,000-foot Mt. Attairo in the southwest is the highest spot on the island; mountains in Krete are visible from this point. In the central and northern parts of the island the surface is rolling and practicable for military operations. There are extensive pine woods.

Rhodes's towns combine Byzantine architecture with the whiteness of most Mediterranean communities. On Saturdays their inhabitants bake their week's bread, so smoke from the ovens hangs over this entire village.

The soil is very fertile, raising every kind of grain and fruits of all kinds. There is a considerable stock of farm animals.

A city of 30,000 people of the same name, located at the north end of the island, is the capital of Rhodes. It is the administrative center of the Italian Dodecanese Islands. The city is one of the best extant examples of the medieval ages, being in an excellent state of preservation. There is an imposing castle, large and moated. Very thick walls with strong towers surround the old stone town. There are two ports; one is suitable only for small craft, but the other is available for medium-sized ships; liners must lie outside.

The Italians have modernized Rhodes. It has become a summer resort, with an excellent hotel—the only one of its class in the Aegean area. Numerous fine bathing beaches are in the vicinity. Very good motor roads extend entirely around the island. The climate is usually agreeable, but may be hot in summer.

Its inhabitants are a variety of Greeks with a special dialect. They have been decreasing in numbers, while the Italians have been increasing. Italian is commonly spoken in towns, stores, etc.

The most common wind is from the west. Consequently the east coast is the more suitable for debarkations. It so happens that the best natural harbor of the island, Lyndos, is on this side. It too has excellent beaches and fine roads leading therefrom. There are other excellent beaches near Philerimo on the north coast.

Rhodes is garrisoned by one Italian division reinforced by special troops, including large air forces. Airfields are numerous, large, and well equipped. The air force present, as in Krete, varies widely. Within a few hours it can be increased or decreased by transfers of planes among the Aegean islands. Defensive works have been erected opposite beaches, and include mine fields. Indications are that the enemy intends to stubbornly defend Rhodes, as a major bastion of the outer belt of Aegean islands.

There are no unusual difficulties about attacking Rhodes. Landings can be made at numerous places, over very good beaches. It is practicable to drop parachutists, and thereafter to land air-borne troops on ground seized by the parachute detachments. Naval ships can approach close to shore to support debarkations.

As will appear later, Rhodes lies at an angle in the enemy's system of defense of the Aegean. In addition to the outer belt of islands, there is a series of enemy bases extending north from Rhodes and close to the shore of Asia Minor. Rhodes is the keystone of the arch. In case the Allies attack Rhodes, prompt support for that island is to be expected. A simultaneous attack on both Krete and Rhodes promises the best results.

Other islands of the outer belt are too small for military bases. They are reported occupied by weak enemy forces which protect emergency landing fields and OPs against raids. Their defense is based on air protection from fields in Greece, Krete, and Rhodes. These islands include:

Scarpanto, a narrow, mountainous island 35 miles long from north to south, in the interval between Krete and Rhodes.

Kythera (Cerigo in Italian), 18 miles from Cape Maléa at the south end of Greece. It has some economic value, as it produces cotton and flax. It contains large caves suitable for shelter of small forces. This island is 20 miles from north to south and 12 miles wide, with good roads.

Antikythera (also known as Cerigotto, Lius, etc.), a small island of 10 square miles, 20 miles from Krete and 20 miles from Kythera; it is not important.

VOLCANO BELT OF ISLANDS

These islands are unsuitable for bases, although they have some good harbors and some economic value. As far as known, the enemy maintains on them only emergency air fields, military police forces, and OPs.

Melos is 14 miles from west to east and 8 miles from north to south. It has a fine natural harbor (with a depth of 30 to 70 fathoms) which strikes in from the northwest side so as to cut the island into two fairly equal parts with an isthmus less than 1¼ miles mide. This harbor is the old crater of which the island is the former rim. Hot springs and hot caves abound. The island furnishes the Axis with small amounts of alum, gypsum, salt, and millstones, and sulphur in large quantities.

Thera (also known as Santorin) is a treeless island of 33 square miles. Here again the crater of a volcano furnishes a fine harbor. On some sides cliffs rise sheer from the water to heights of 600 to 1,300 feet. This volcano was last reported in violent eruption between 1866 and 1870.

Nisiro (Nysiros in Greek) is the end of this belt. It is a latent volcano within the Italian Dodecanese, with a good harbor.

Other islands in this belt have no special features of military importance.

CENTRAL BELT OF ISLANDS

This belt is composed of the summits of a mountain chain—largely underwater—extending from the Greek mainland in Thessaly, at first southeastward, thence curving to the east to include Samos adjacent to the Asia Minor coast. With the exception of the last island, only weak enemy forces (for emergency and observation purposes) are reported on the islands of this belt. Samos is strongly held.

Evvoia (or Euboea) is the largest of the Aegean Islands after Krete. It is 90 miles long from northwest to southeast and 4 to 30 miles wide, having an area of 1,385 square miles. Is is of considerable military importance, as north of Athens it blocks all approach to the east Greek coast. Nevertheless, the enemy is not maintaining other than emergency forces on the island.

The reason is that the island is very mountainous. Its east coast is almost entirely composed of precipitous cliffs. The west side has harbors, but these are within gun range of the mainland. And in order to reach the west side ships have to pass through narrow straits, easily blocked by artillery fire, at the north or south ends. Navigation through these straits and the channel west of Evvoia is difficult because of powerful currents which change to opposite directions in an irregular manner.

Mountains on the island consist of four groups. In the north are the Galtzades, 4,436 feet high. Then going south are the Kandili Mountains (3,965 feet), the Delphs (5,725 feet), and the Ocha Mountains (4,830 feet). There are forests in the north, and elsewhere good pasturage for a considerable number of cattle and sheep. Iron and copper mines are known to exist; they were exploited in ancient times but were not in production at the time of Axis seizure; they may be now.

The principal town is Khalkis (or Euripos), of about 10,000 people and located at about the center of the west side at the narrowest point of the Strait of Euripos. This city's name means ore-town, although no ores have been mined here in modern times. A drawbridge connects Khalkis with the mainland and with the railroad. It is therefore possible for the enemy to send troops to the island rapidly, at any time.

Andros is an island 25 miles long in prolongation of Evvoia and separated from it by the 7½-mile-wide Canale d'Oro, noted for being stormy. This island, only about 10 miles wide, is too small for a military base. Harbors exist on both east and west coasts. The island produces corn, grapes, and lemons. Its population of some 20,000 is 70% Greek and 30% Albanian, living in separate areas. Mountains rise to an altitude of 3,280 feet.

Tenos (or Tinos) is the next island in the chain, and only 15 miles by 7 with an area of 78 square miles. There are two good ports, and the island produces corn and grapes. There is one mountain exceeding 6,200 feet.

Mykonos lies just south of Tenos but is still smaller. It has a good harbor and is a trade center.

Syros, 15 miles southwest of Mykonos, is only 10 miles by 5, with 42 square miles. It is the commercial center of this part of the Aegean, with a good port at the capital of Hermopoulis. This island is a brown and barren rock—practically treeless, although pasturage exists for goats and sheep.

Ikaria (or Nikaria) is on the opposite side of Mykonos from Syros and 28 miles from Mykonos. It is 22 miles long from west to east and 10 miles broad at its widest. There are no good harbors on this island, but a small port exists on the north side.

Samos is the last island on the east end of the central belt. It is a very fertile island, 27 miles from west to east and with a maximum width of 14 miles. It is strongly held by the enemy.

A mountain chain runs down the long axis of the island, with its highest summit (4,725 feet) at the west end. The country is in general rolling, open, barren, and nearly treeless. The enemy has constructed and is using several airdromes. The island is well cultivated, raising fruits and tobacco; its population is 55,000.

The capital is Vathy, at the head of a good harbor at the east end of the north coast. At the east end of the south side is another harbor, Tigani (or Tignai). This is within 3 miles of Asia Minor and consequently could be covered by artillery fire from the mainland. Probably for this reason and because the enemy line of supply extends northward, Tigani is not used as a port. It is noted for its immense moles, originally built in ancient times by Polycrates and recently repaired and improved. An aqueduct for fresh water, built about the same time and largely in tunnels, is still in use.

The enemy garrison in Samos is reported to be all German. Its strength is not known. It has at different times varied considerably from as little as a regiment to at least one division.

INNER BELT OF ISLANDS

Another series of summits forms this belt of islands. It extends from the north end of Evvoia across the Aegean to Khios. As in the case of the central belt, the enemy holds the east island in strength and has only emergency forces on the other islands.

The *Northern Sporades* are a group of small and wooded islands east of the Gulf of Volos and northeast of Evvoia. The largest is *Skyros,* about 20 miles long and the most southerly of the group. It has a good harbor.

Psara (or Ipsará) lies nearly 50 miles east by south from Skyros. The intervening sea is a submerged ridge, and could

be mined. Psará is only about 5 miles in diameter and not important, but it has a small harbor.

Khios (or Scio) is only 5 miles off Asia Minor. It is 30 miles long from north to south and 8 to 15 miles broad, with a population of 70,000. The island is celebrated for its beauty and its fertility, also for its craggy coast. Earthquakes are frequent and violent, consequently buildings do not exceed two stories in height.

The principal town is Khios (18,000 people) just south of the center of the island and on the east side of its narrowest part. Adjacent is its port, Kastron, which is 7 miles off the coast of Asia Minor. This port is well protected and is suitable for a base.

This island resembles other Aegean islands, being mountainous but with considerable rolling country available for military purposes in the south and northwest parts. Its products include antimony, a little iron, and oranges, figs, olives, and similar fruits. A specialty is gum-mastic; this is intended to be chewed, but when dissolved in water it is a fair substitute for whiskey, with approximately the same effects.

Large airfields are open on this island, and the enemy holds the island in strength, all troops being German. Air forces vary in numbers, but the island is ready to receive and service air troops in considerable strength.

If this island is attacked and Turkey is at that time a party to Allied operations, Kastron can be placed under artillery fire from batteries in Asia Minor and landings made in this area. This promises the quickest results. If Turkey is neutral, there is a large bay on the west side of the island (with numerous possible landing places) where debarkations can be covered by naval vessels.

The enemy has fortified this island. At one time he appears to have had about two divisions present, then the garrison was reduced to a brigade or less. It has recently been increased, but to what extent is not known. It would be best to figure on at least one division's being present.

DETACHED AEGEAN ISLANDS

North from the inner belt of Aegean Islands are several islands, not belonging to a geographical chain, distributed over the northwest corner of the Aegean Sea. They cover the approaches to the Dardanelles.

Lesbos (or Mytilene) is about 35 miles north of Khios and, like it, is close to the shore of Asia Minor. It is held by strong enemy forces and prepared for defense. It is 55 miles long from northwest to southeast and around 25 miles wide, with 138 miles of coast line. A deep gulf on the west side almost cuts the island in two; this gulf is not suitable for a base, being too shallow. The city of Mytilene at the southeast has a good port and is suitable for a base. The port is called Kastron—the same name as at Khios.

The island has mountains which reach 3,080 feet. There is some rolling ground, which supports a population of 130,000 and produces wine, oil, and grain. There is a good road system. As at Khios, earthquakes are normal.

Its distance from the Asia Minor shore varies from 7 to 10 miles, which would permit artillery support if Turkish soil is available. If not, landings can be made on the north and west sides. There are several small ports and quite a number of beaches. There are also large air fields, and the enemy has had time to prepare defenses. The strength of the garrison is not known, but the size of the island indicates that it would be a division or more.

Lemnos (or Limnos or Stalimene) is one of the best possible bases in the north Aegean area and is strongly occupied by the enemy. This island is of irregular shape, with a maximum length from west to east of about 22 miles and a width of 15 miles. On the south side is a deep gulf suitable for a naval or expeditionary force base. It was so used by the British during 1915 and 1916, as the Mudros base. Another excellent but smaller port is on the west side—called Kastron, which is the usual name for a port in this part of the world. The coast line is 115 miles.

This island is bare, being nearly without trees, so no fuelwood is available. There is considerable pasture and the people, numbering about 30,000, raise sheep.

Mudros harbor is only 30 miles from the entrance to the Dardanelles and 55 miles from the entrance to the Gulf of Salonika. The airfields on the island can easily cover all the north section of the Aegean area. Istanbul is 120 miles in an air line. It is 40 miles by air from Lemnos airfields to Khios airdromes. In Bulgaria, some 100 miles away, are Axis air bases with large repair facilities. This island is one of the most important of the enemy bases in the Aegean area. At present the garrison is all German.

This island would be equally valuable for the Allies preliminary to an invasion of Europe through any part of the Balkan area.

Imroz (or Imbros), *Samothrake* (or Samothrace), and *Thasos* are three islands north and northeast from Lemnos. Too small for bases, they have not been occupied by substantial enemy forces. Latest reports are that minor Bulgar forces are present.

COMMENTS

The enemy occupies all of Greece on the west side of the Aegean Sea, and the Macedonian coast on the north side (less the area under Turkish rule) east from the Meric River. These enemy positions on the mainland will be discussed in another article. On the east side the enemy occupies in force the defended islands of

Lemnos—	**German garrison**
Mytilene—	**"**
Khios—	**"**
Samos—	**"**
Lero—	**Italian garrison**
Rhodes—	**"**

Between Lero and Rhodes is less than 100 miles. All other islands mentioned are within 50 miles of the adjacent ones. The south side of the Aegean is held by occupation of

Rhodes—	**Italian garrison**
Krete—	**German garrison**

Krete is within 100 miles of the Greek mainland to the west, and within the same distance of Rhodes on the east.

Defense of the Aegean is by occupation of the perimeter in a series of centers of resistance. About 475 islands in the center of the sea are held only by small occupational forces, all Italian, who may furnish certain emergency or auxiliary services in addition to their normal duties of preserving order. The enemy has avoided dispersion of his forces by limiting the number of places defended outside of the mainland to only seven, or eight if Scarpanto is included. The position as a whole forms the Aegean Quadrilateral.

The east side of this perimeter deserves special attention. In addition to a mission of defending the Aegean Sea, it is suitably organized for an offensive mission in case Turkey is attacked by the Axis. The six occupied islands along the east coast of Asia Minor are each large enough to concentrate several divisions and large air forces. Turkish reports indicate that this was actually done at one time. It may be repeated. As the islands are only a few miles off shore, and four of them are within supporting artillery range, it would be possible for the enemy suddenly to launch invasion forces into Asia Minor anywhere along the west coast, while at the same time other forces march overland from Bulgaria toward the Sea of Marmora. Assuming motorized

forces were used, the mission would be to capture the Dardanelles and Bosporus areas before Allied armies marching from Syria could arrive there.

For the Axis the distances would be from 50 to 250 miles, as against minimum distances of 500 miles for troops from Syria. Both forces would be around 300 miles from Ankara. Somewhere on a line from the vicinity of that city to the Gulf of Adalia, an Axis holding line to delay the advance of hostile forces coming from the east might be expected, while the main force was attempting to capture the Istanbul Straits.

Against such a possibility a vigorous offensive against Rhodes and the east perimeter of the Aegean Quadrilateral is indicated, with a double mission of opening a passageway through the Aegean and interfering with enemy attempts against Turkey.

Famous "show battery," "C" of the 3d FA

GLORIOUS MUTINY

By An Arch Mutineer

In this story exact times and names are unimportant. They can be had from records buried in warehouses in Washington, where just now people are too busy creating many regiments to search for the data bearing on an incident in the history of one. So the story will be written from memory, years after it should have been made of record.

It is the story of the "mutiny" of a regiment, a bloodless but successful one. It was 1921, at Camp Grant, Illinois; the regiment was the Third Field Artillery,* Colonel Willard D. Nebill, commanding. At that time the regiment was a unit of the Sixth Division and had been at Camp Grant since its return from France, where it had arrived in time to complete combat training but too late to get into action. The mutiny sprang from insult added to injury; the injury was the nonparticipation of the regiment in action in World War I, a unique experience in a history which dated from pre-Revolutionary War days; the insult, a War Department order relegating the Third Field Artillery to the inactive list of the Army.

Up to recent years, the annual Army Register included brief histories of Regular Army units. The practice, now discontinued, probably will never be revived, and it is just as well because in 1921 meaningless names began to appear masquerading as historical facts. Paper regiments were juggled and shuffled, named, renamed, transferred, organized, reorganized, and disorganized beyond the ability of anyone now to sift fact from fancy. For a while, prior to this period, it appeared that General Pershing's recommendation for a real Army would be carried into effect. Hardly had the ink dried on the plan for reorganization when disruption set in. Pacifism, idealism, war weariness, and economy played their parts, and in 1921 decimation of the Army began.

The news came to Camp Grant that the Sixth Division was to be broken up, and to the Third Field Artillery that it was to go on the inactive list, transferring its standards and its records to a "parent" regiment, itself a recruit in the history of the Army. That the regiment should be selected to suffer dissolution had not been given a thought, but here was action to that very end. And so action on the part of the regiment was indicated, fast action to have this decision recalled.

And action was had. The officers, less the regimental commander, met to deliberate as though the same thought had occurred to each member independently and at the same moment. Decisions were made. The regimental commander was to take leave, go to Washington, see the Chief of Staff of the Army, and announce that the regiment declined to be placed on the inactive list of the Army. Following this decision on the part of the officers, a meeting was arranged with the senior non-commissioned officers. They fell in with the plan and promised

*The 3rd Field Artillery Regiment went to Fort Sheridan, Ill., became the 14th Field Artillery, went to Fort Riley, Kansas, and was successively the 84th Field Artillery, the 1st Battalion 3rd Field Artillery, the 3rd FA Bn, and now the 3rd Armd FA Bn.

the concurrence of the remainder of the enlisted personnel. Colonel Newbill's trip was to be financed by a twenty-five cent contribution from each non-commissioned officer, the balance of the expense to be collected from the officers.

Colonel Newbill, upon being informed of the plan, acquiesced wholeheartedly, as had been expected. He obtained leave and advanced on Washington without delay. There he made his reconnaissance, in the Office of the Chief of Field Artillery and in the General Staff, to obtain information as to the basis for the War Department action. He obtained a hearing by the Deputy Chief of Staff, General Harbord, and requested an appointment with General Pershing. General Harbord was most sympathetic, and after hearing Colonel Newbill's story telephoned the substance of it to General Pershing with a recommendation for favorable consideration. General Pershing's decision was prompt and favorable, not only for the Third Field Artillery, our oldest regiment, but for the Fifth, containing our oldest battery, which regiment had suffered a like fate.

"B," 3d FA Bn. approaching Stagg Hill, Manhattan, Kansas

The rest was celebration. First came a telegram from Colonel Newbill announcing the success of his efforts, which stimulated the bending of elbows. There followed Colonel Newbill's triumphal return. He was met at the reservation gate by his entire regiment, mounted, and escorted to the regimental area. In his 20 × 20 living quarters he told the story of his visit to the officers and high-ranking noncoms, and dispensed refreshments obtained on his detour through New York on the way home. Then he told the story all over again to the regiment as a whole, together with the wives and children, all gathered on the lawn of the officers area, which had been organized for a buffet supper. And for consumption before, during, and after supper there was punch, spiked with prune brandy gathered by a foraging detachment, fine, old prune brandy aged at least forty-eight hours. There were headaches the next morning, but in the acquisition thereof not one instance of disorder on or off the record. And thus ended the bloodless and glorious mutiny which kept alive, for the time being, the Third Field Artillery, horse-drawn 75-mm gun regiment, Colonel William D. Newbill, commanding, bless his heart.

AMERICAN MILITARY INSTITUTE

Among the great powers, the United States is the only country in which the civilian study of military problems has received no official support. For many years the American Military Institute, a non-governmental association organized in 1933 under the laws of the District of Columbia, has attempted to fill in this gap. Its mission is to promote the historical study of war and military power, especially as these problems relate to the security of the United States. From 1936 onward the American Military Institute has published *Military Affairs*, the only scholarly publication dealing with the military subjects in the United States. It has published this well-edited journal at a loss, and needs the support of all men in the service and civilian life who see that our national welfare is intimately connected with military matters. It is particularly important that the American Military Institute receive enough support to enable it to carry on its vital functions in the post-war period when the temptation to "get back to normalcy" and "forget the army" will be great.

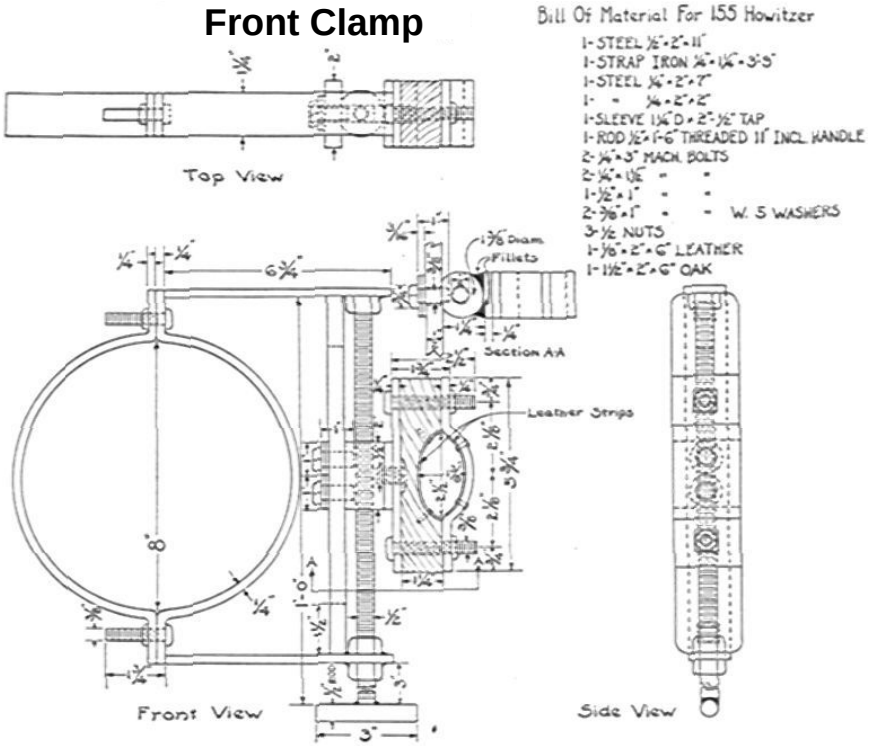
Membership in the Institute is "elective," but is open to those in the armed services and civil life who appreciate the importance and desire to encourage the study of military power and institutions in these critical times. Those who wish to become members should send their names to Dr. Harold Sprout, 2 Dickinson Hall, Princeton, New Jersey. Annual dues of $3.00 include a subscription to *Military Affairs*. Life memberships are $50.00, and a Founder membership can be established by contributing $250.00 or more. Institutions or individuals who are not in a position to become members may subscribe to *Military Affairs* at the membership rate. Gifts to the working funds of the American Military Institute are urgently needed.

The officers of the American Military Institute are Dr. Robert G. Albion, President; Colonel Arthur L. Conger, President Emeritus; Vice Admiral William L. Rodgers, President Emeritus; Major General Frank R. McCoy, Vice-President; Dr. Dallas D. Irvine, Provost; Dr. Harold Sprout, Secretary; Dr. Robert H. Bahmer, Treasurer; and Dr. Edward G. Campbell, Editor.

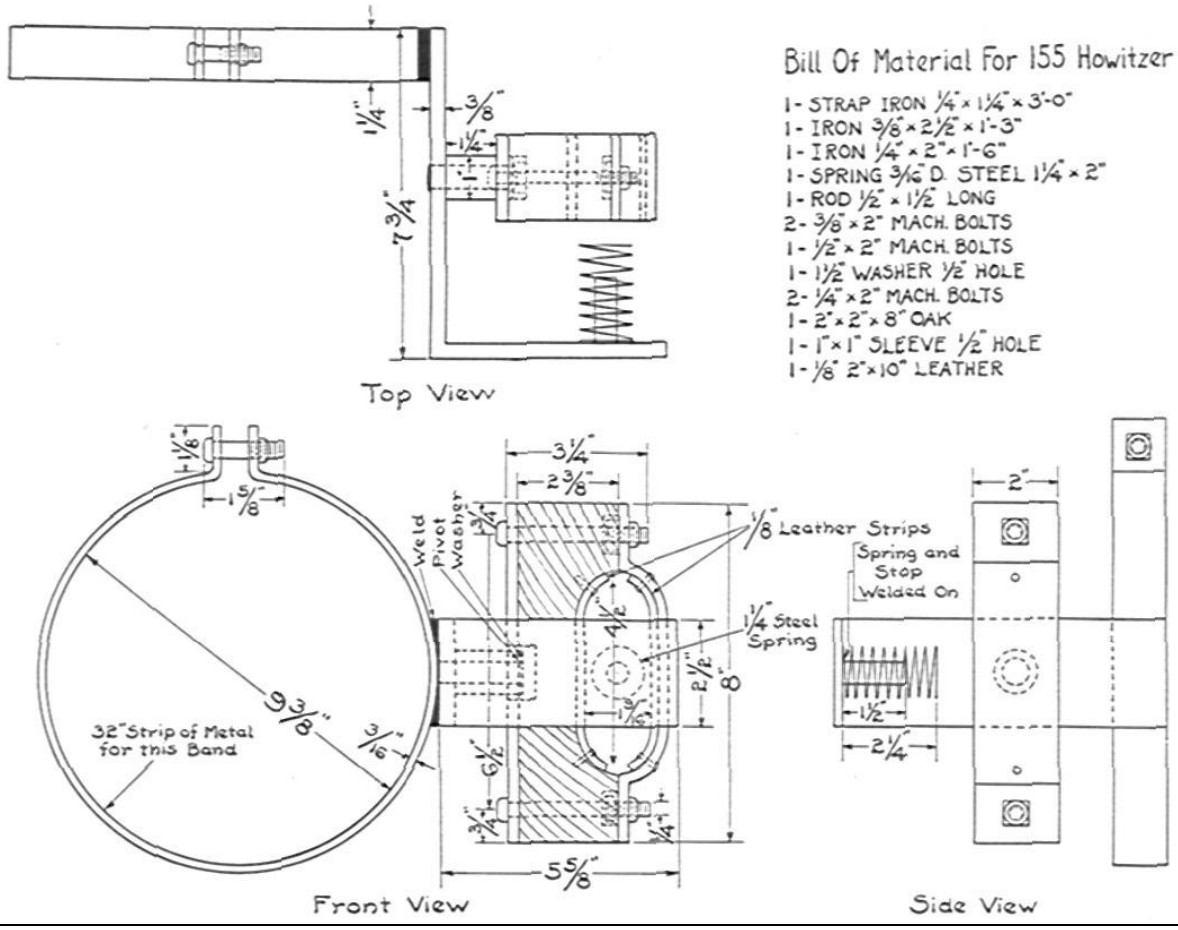
Because of interest in a .30-cal. sub - caliber mount for the 155-mm. howitzer (page 5, January, 1943, *Journal*), we present herewith all necessary information for building the clamps required.

Incidentally if your terrain is too flat (so that bullets hit sundry debris in the impact area), bulldoze a 4-foot mound and place the guns on it.

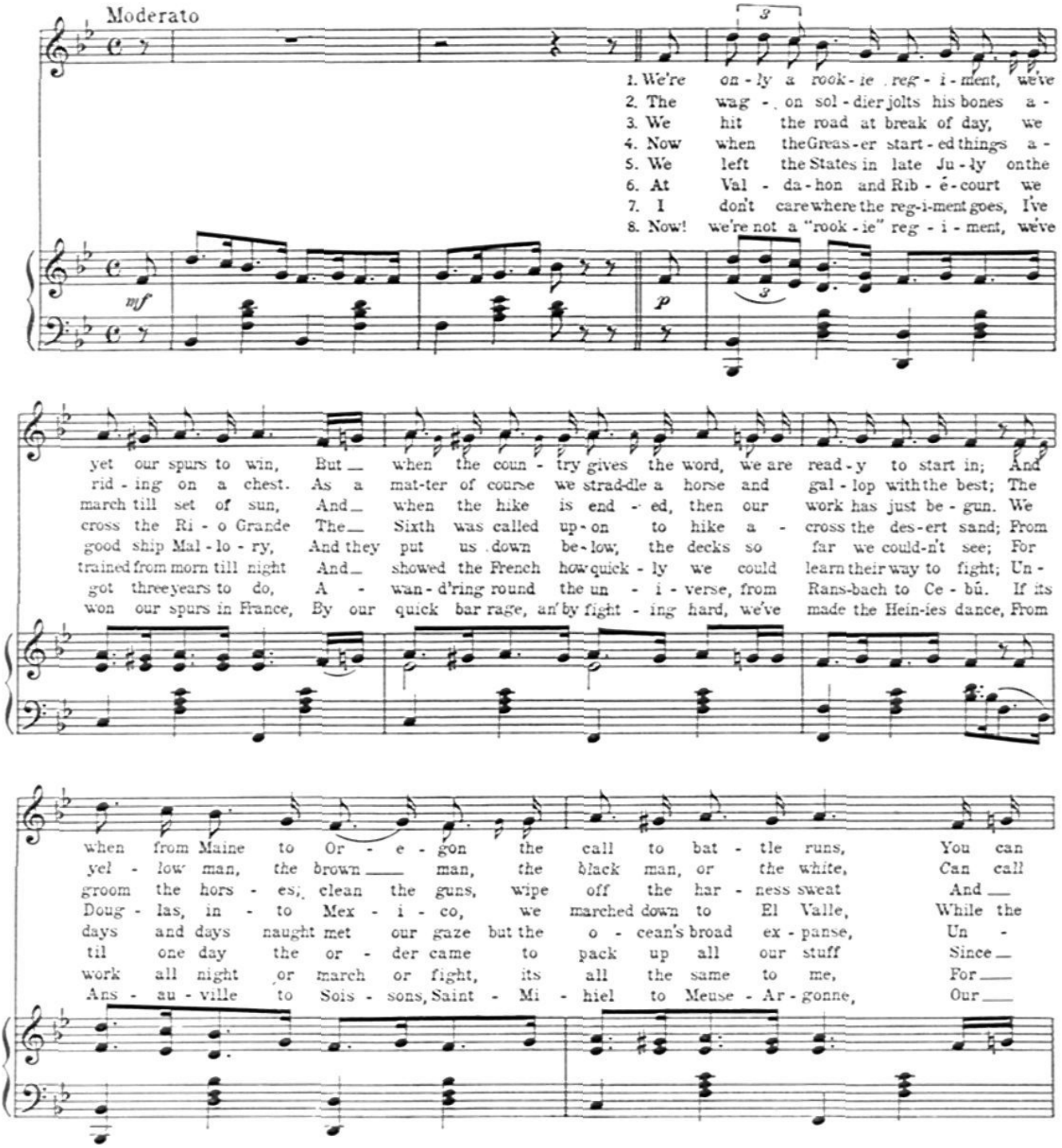
Front Clamp

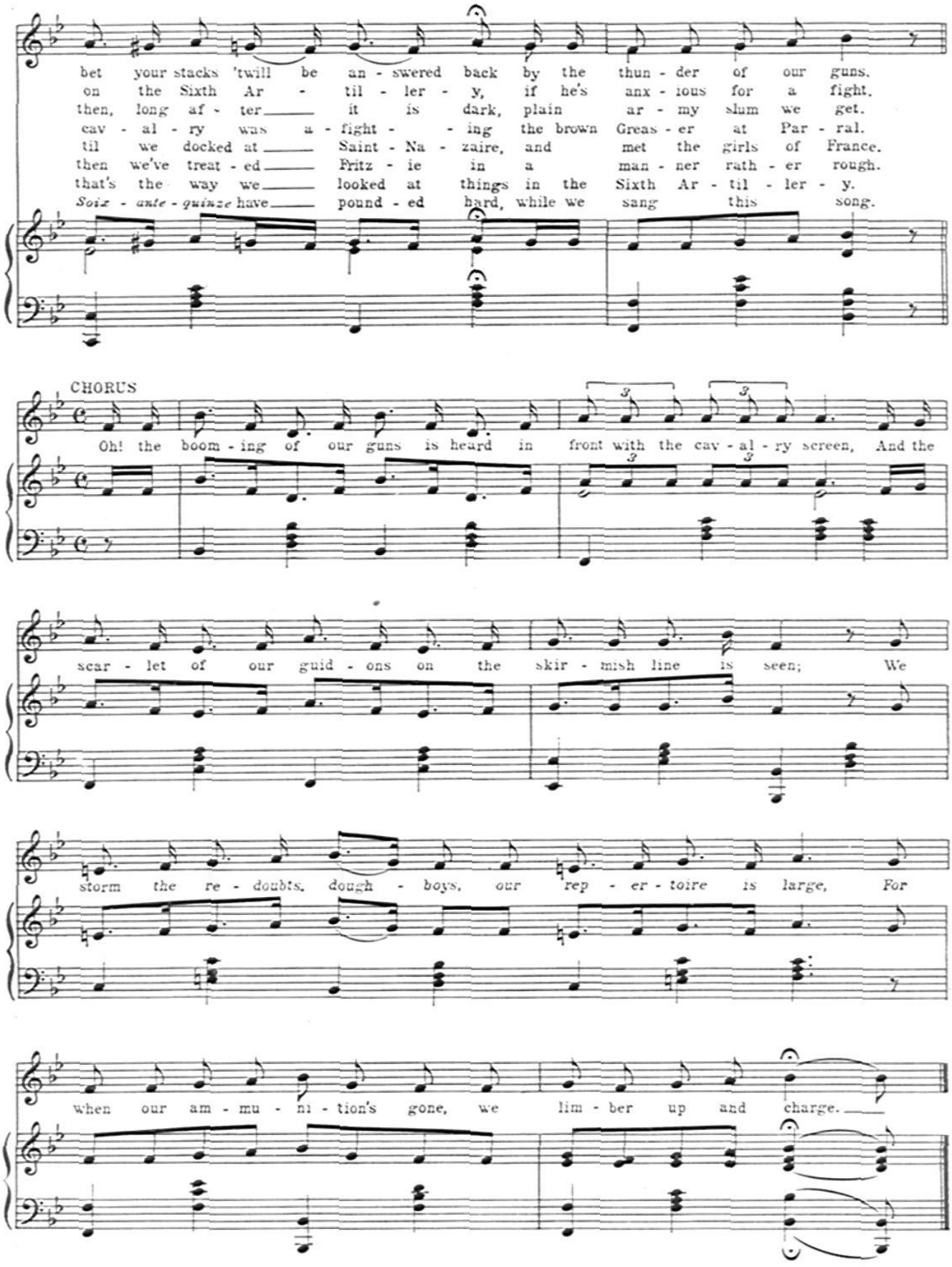


Rear Clamp



Sixth Field Artillery Song



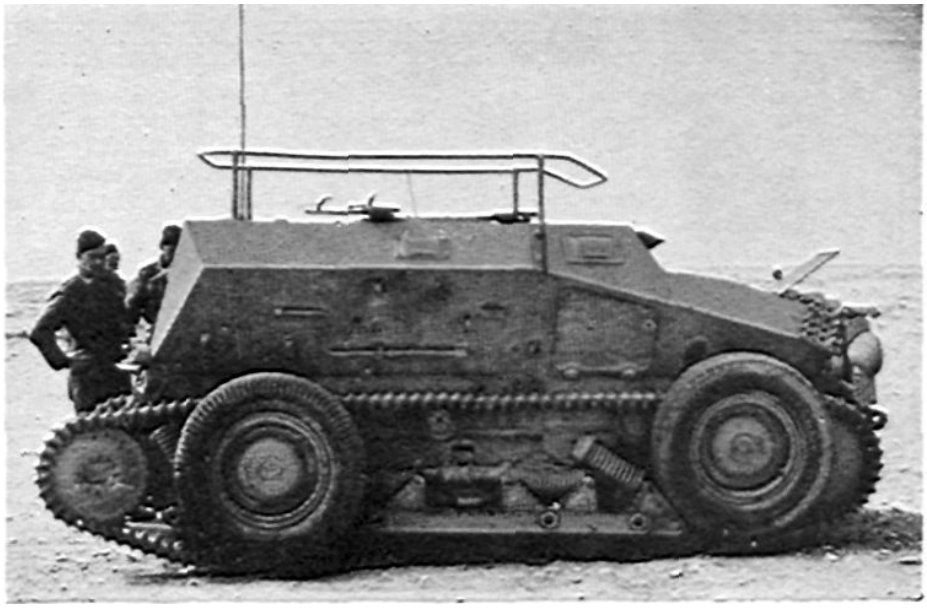

bet your stacks 'twill be an - swered back by the thun - der of our guns.
on the Sixth Ar - til - ler - y, if he's anx - ious for a fight.
then, long af - ter it is dark, plain ar - my slum we get.
cav - al - ry was a - fight - - ing the brown Greas - er at Par - ral.
til we docked at Saint - Na - zaire, and met the girls of France.
then we've treat - ed Fritz - ie in a man - ner rath - er rough.
that's the way we looked at things in the Sixth Ar - til - ler - y.
Soix - ante - quinze have pound - ed hard, while we sang this song.
CHORUS
Oh! the boom - ing of our guns is heard in front with the cav - al - ry screen, And the
scar - let of our guid - ons on the skir - mish line is seen; We
storm the re - doubts, dough - boys, our rep - er - toire is large, For
when our am - mu - ni - tion's gone, we lim - ber up and charge.

Tactics of Artillery

With Special Reference to the Germans

By "Ultima Ratio"

In the Journal of the Royal Artillery



This German OP vehicle is convertible, to run on wheels along roads or on tracks across rough ground. A hatch gives access to the flat observation platform, which has a "luggage rack" rail so the observer(s) can be braced. Slit openings, with flaps, are on sides and front. This car is apparently radio-equipped, and has the inevitable starting-crank. A crew of at least three (observer, driver, and radioman) is required with this equipment, but it probably includes also a BC and an NCO.

With the limelight shining so brightly on Panzer and Stuka, the spectator often fails to see the other actors in the drama of this war. But the infiltrating infantryman lurking appropriately in the shadows has been playing his subtle part in the development of the plot; and that great actor-manager, the gunner, is preparing to take once more the center of the stage. It looks as if the old principle of war—that the best results are produced by the co-operation of all the arms—will be vindicated before the curtain falls. This principle must be borne in mind when we are inquiring into the proper use of artillery.

It is in the Russian campaign that artillery action first comes into prominence. In the great fighting retreat that arm played a noble part in defense. German prisoners who made the all too familiar complaint about the enemy's aircraft were usually outbid by others who cursed the Russian guns. And in reports of the Russian offensive we are constantly reminded of the long arm and the powerful punch of the artillery.

In Libya, too, one of the striking lessons of the campaign was that the tank can be mastered by the gun. It is no longer necessary, therefore, to argue wordily that artillery is not an outmoded weapon. The guns themselves have spoken.

"It is with artillery that one makes war," said Napoleon; and, since satisfactory wars are made up of battles, we can save paper by confining our examination to the kind of artillery which wins battles. We can ignore the Big Berthas whose influence, if any, must be strategic—or even political; we can ignore the super-heavy siege guns, since sieges are not battles; and we need not concern ourselves with antitank and antiaircraft guns, since they are narrowly specialized and purely defensive weapons which only function by reaction. But it is safe to prophesy that no major battle will be fought in this war which will not present opportunities to the field and medium guns of the divisions. These are the general-purpose weapons of the artillery. In attack or in defense they will strongly influence the decision.

This influence will be exerted in two ways—by the destruction of the enemy or by his neutralization. The former is the stronger form of artillery action, the latter is only a means to an end. It imposes a restraint on the enemy and so enables some other arm to destroy him.

Let us examine these objects in turn.

Destruction

There are severe limitations to the power of the artillery to destroy the enemy. It may be difficult to construct a shelter which will keep out a medium shell, but it is easy enough to provide—or find—cover which is splinter-proof. Any hole in the ground will do. To destroy men thus sheltered, the guns must score direct hits on their slit-trenches or fox-holes; and that will involve a large expenditure of ammunition and time.

The picture is quite different, however, if the enemy is not crouching in fox-holes but moving upright on the surface. It will then not be necessary to score direct hits on him, as the splinters from near misses will destroy him.

If, then, artillery can only destroy the enemy when he is exposed to the splinters of its shells, it will be seen that action which aims at destruction will be normally a defensive measure; for it will be usually when he is attacking that the enemy will thus expose himself. A defensive barrage will give him the choice of death or going to ground; and in either event the attack is stopped.

Neutralization

The object of this is to prevent the enemy from using his weapons effectively and from moving. Artillery may try to achieve this object with smoke shell, which blinds the enemy's observation; with gas shell, which slows his movements and

denies him certain areas by contamination; and with ordinary HE. The first does not prevent movement, the second can be countered by good antigas equipment and training; so our examination will be chiefly concerned with the last.

The main characteristic of neutralizing fire is that it is only one half of a joint operation and is quite useless unless the other half is forthcoming. It can never force a decision by itself, but it can help others to force a decision. So, while the artillery fires, other arms—infantry or tanks—must take advantage of the temporary helplessness of the enemy to further their own progress.

This necessity is not sufficiently realized by the young soldier who is prone to sit down and applaud the fireworks of the artillery instead of making use of them. If he only begins to move when the shelling has stopped or has been switched on to an entirely new area he will find too often that the enemy force, which has been the target of the concentration, has "come to life again." This lesson was learned at bitter cost in the earlier offensives of the last war—offensives which were preceded by far heavier bombardments than we are likely to see again.

This joint operation is an example of the working together of different arms in the battle, which is sometimes called "Grand Tactics." But the phrase need not frighten us.

The commonest form which it takes is the combined action of infantry and artillery, and the soldier can study this on a large canvas in the barrage plans of the last war when whole armies attacked. But he would, perhaps, gain more practical benefit by studying the minor operations like trench-raids, though the official histories may have little to say about them.

Some Russian 76.2-mm AA-AT guns have had varied careers. For example, this piece was captured by the Germans, transported to North Africa for use against the British, and captured by them and again turned against the Nazis.

The fact is, however, that these "Grand Tactics" can be arranged on the smallest scale—even for a section of infantry and a single gun. They depend on simple principles, the main one being that *while the artillery fires, the infantry moves*. Others are:

(i) That the infantry must "cling to the barrage," for if they hang back they lose the benefit of it.

(ii) That the artillery fire should lift only the minimum distance off the objective. This will prevent the defenders from knowing that the fire has moved on; and they will be found still crouching in their holes when the attackers arrive on the parapet.

(These are for Grand Tactics *par excellence,* where both arms are engaged against the same objective. In other cases, such as the neutralization of hostile batteries during an infantry attack, the minor principles are not applicable.)

BATTLE TACTICS

German

When we come to examine artillery tactics as demonstrated on the battlefield we find that most of our data will be supplied by the German and British gunners of the last war. A comparison of their methods reveals a fundamental difference of outlook between the two armies; and from this fact, as well as from results, we may draw lessons for today.

German artillery tactics in the last war tended to lack *finesse*. Their preponderance in medium and heavy howitzers in 1914 made them prefer bludgeon strokes to more delicate work. Their heavy shells moved ahead like giants' feet, crushing the Belgian forts one after another—and then pygmies could occupy the sites. They used the same methods against human resistance in their advance to the Marne.

Now these tactics were already a century old in 1914, being, indeed, the tactics of Napoleon, who would often mass hundreds of guns against a portion of his enemy's front and literally blast a hole through for his attacking columns. The idea is put simply by one of his generals, who said to his supporting gunner: *"Je n'entends rien de votre affaire; mais fichez-moi un trou et j'y passerai."*

It seems that the German gunners of 1914 aimed at the *destruction* of the enemy and that they expected this result from their policy of concentrations. At Ypres the guns had indeed blasted a hole in the British line; but when the German infantry came forward they found the Worcesters had closed the gap. The artillery had evidently failed to do their job, so the battle was surrendered!

This supports the view that the German theory of combined tactics was that *artillery conquers the ground, infantry merely occupies it*.

For three years after Ypres the Germans were generally on the defensive and they continued to use concentrations. Against troops in the open these had destructive effect, but against troops in trenches, in gunpits and in cellars the effect was mainly moral—and that was soon lessened by familiarity. There was, however, nobody to tell the Germans that their ammunition was being wasted.

But some doubts must have been raised in their minds when they found that our offensives persisted in spite of their destructive shoots. There is, of course, no logic behind the tactics of concentrations unless the dispositions of the enemy are known; and this knowledge was denied to the Germans whenever

they lost a bit of high ground or the mastery of the air. So, in 1917, they evolved the technique of the "Area Strafe" by which they combed an area repeatedly backwards and forwards till it seemed that nothing in it could escape unhit. Nevertheless much did escape—and there were a vast number of areas.

British

The British, on the other hand, being on the offensive, discovered quite early that many machine guns and gunners survived preliminary bombardments. They therefore abandoned the idea of *destroying* the enemy with artillery and adopted instead the combined tactics plan of *neutralizing* him with artillery and destroying or capturing him with infantry.

The creeping barrage tactics which were henceforward the basis of all our attacks had to go through growing pains before they became a really efficient instrument for capturing positions. Field gunners had to study the various factors which affected the shooting of their guns; and infantry had to learn to move in close proximity to the shrapnel bursts and to accept the chance of a short shell, rather than "lose the barrage" which was neutralizing the enemy's machine guns.

In the upshot the creeping barrage became a stereotyped drill for artillery-cum-infantry tactics. But the principle behind it was no new discovery of 1916. It had proved successful in earlier wars.

"The fire of these guns," says a report, "prevented our men from raising their heads above the earthworks and the enemy's infantry made a sudden and gallant charge up to and over our entrenchments. Our line thus pierced gave way."

The writer is a Confederate commander; the scene, Nashville; the date, 1863.

GERMAN GROPINGS

We return now to the German gunners whom we left doing "area strafes" in 1917. That the High Command was still dissatisfied with their tactics is clearly stated by Ludendorff in his *Memoirs*. He writes of the Passechendaele period: "Another tactical detail which was emphasized (in the revised Defensive Battle Manual) was the value of ground observation for artillery. Only by that means could the attacking infantry be annihilated, or fire be concentrated on decisive points of the battlefield."

He had discovered, indeed, that concentrations are worthless unless targets are known and unless they are massed.

But it was not until the Germans took the offensive in March, 1918, that the weakness of their artillery methods was glaringly revealed.

For his attack on March 21st Ludendorff massed guns on a scale of a hundred per kilometer of front, yet found this did not insure the destruction of the enemy. He included a "rolling barrage" in his plan and points out the necessity for the infantry to keep close to it. "It was always a great misfortune," he writes, "if the barrage got ahead; the attack was then held up only too easily." The attack of the German 17th against the British 3d Army did in fact fail for this reason. These observations, though they appear in the Memoirs in the account of the preparation of the offensive, can only have been wisdom after the event. But this cannot be said of two other elements in Ludendorff's plan. One was the use of surprise; the other was the acceptance of neutralization as a legitimate aim for the artillery.

Both ideas, however, originated in another brain.

It was General von Hutier who, at the battle of Riga on September 3d, 1917, started a revolution in German tactics. When military theorists had for years been harping on the envelopment theme he showed that *penetration* could produce decisive results; and that penetration, to be successful, need not be on a wide front. He demonstrated, moreover, how the penetration could be made.

He attacked on a front of 5,600 yards. A sudden hurricane bombardment, mainly with gas shells, from massed guns (one per 8 meters) prepared the attack; the whole operation was over in a few hours and success was complete.

For March, 1918, Ludendorff adopted some of the methods of von Hutier. Registration by artillery was forbidden, and survey, calibration, and weather information were to take its place. "G.H.Q. intended," says Ludendorff, "that after a short artillery bombardment lasting only a few hours the infantry was to advance. This short, powerful bombardment was expected to *paralyze* the enemy's artillery by means of *gas,* which spread over great areas, and keep his infantry in their dugouts." Thus surprise was to be achieved and neutralization, not destruction, was to be the object of the guns. Gas, as being persistent in its effects, was to be the neutralizing agent.

But Ludendorff did not adopt the whole of the von Hutier technique. The attack on a narrow front was too unorthodox for 1918, though it is the normal tactics of the German army today. And he introduced factors which had no part in the battle of Riga. One was the British device of the "rolling barrage" already mentioned; the other was the "infantry gun."

CLOSE SUPPORT

Ludendorff points out that massed artillery could only prepare the attack in a general way and "left untouched too many strong points which had to be dealt with later in detail at the shortest ranges. . . . Field guns were withdrawn from their units for short range work and were attached to battalions or regiments as infantry guns."

The tactical use of these weapons has introduced a new element in German artillery methods and calls for a detailed study. Their function is, in general, the close support of the infantry; and, in particular, the reduction of localities overrun by the main fire-plan of the attack.

Each function deserves a paragraph to itself.

"Close support" by artillery may be defined as covering fire which:

(i) is on ground close to—say within 100 yards of—the troops who are being supported,

(ii) can be immediately "laid on."

The German solution to the problem is the infantry gun company, which is now an integral part of the German infantry regiment and has special weapons of its own.

The light 75-mm gun has many good points. It is small, therefore easy to conceal. It weighs only 7 cwt, so it is easy to manhandle. It has a useful range and weight of shell and is capable of both flat and high angle fire. Tactically it is used with the greatest boldness, often coming into action in front of the heavy mortars and firing at a range of a few hundred yards.

It is the embodiment of the German idea of close support which is to *site the gun in the forward areas*. This solves the problem of *quick* support, but it throws away the advantage of range and renders the gun vulnerable to infantry weapons.

The British method of close support has been different. In the last war British field artillery habitually brought fire to bear on ground within 100 yards of its own infantry. The problem of *quick* support, however, was a greater one to solve owing to the difficulty of maintaining communications.

The S.O.S. rocket, timed programs, and the general aggressiveness of the R.A.F., which forestalled many of the infantry's requests, went some way toward providing a solution. Now, with wireless available, it is possible to provide artillery support which is both close and quick; and the guns need not be in the forward areas. If they are some distance back they can be more generally useful and more continuously active.

The German method, for all the attraction which dash and boldness have for the soldier, is really a sign of weakness. It was because he despaired of effective cooperation by the artillery that Ludendorff gave the infantry their own guns.

It cannot, however, be claimed that British field gunners solved the particular problem in close support which is presented by the strong point which survives the main attack.

It is generally agreed that if a program plan has been arranged it is inadvisable, though not now impracticable, to alter it during the operation. Bringing back the barrage or whatnot will check the progress of the successful elements among the attacking troops; and that savors of the limited objective and the slow but sure methods which have been discredited. The *blitz* principle is always to reinforce success, never to reinforce failure. Nevertheless the strong point is still there, a material fact which we cannot dispose of by quoting principles.

We can make the best of both worlds by having special artillery for the minor tasks. While the main fire plan continues to support success, the special artillery can remedy the failures.

The Germans have such artillery in their infantry guns; but for this role, too, the objections to their policy of using guns as front line weapons holds good.

Since, however, there is a powerful school of thought which advocates such a policy we must reopen the question for further examination.

Open Sights or Mumbo Jumbo?

That artillery must learn to come out in the open instead of doing "mumbo jumbo behind a hill" is the advice of a British military writer. Miksche, in *Blitzkrieg,* strongly urges that artillery should fire over open sights at "actual targets rather than at areas." He deprecates "complicated techniques" and points out that direct fire at short ranges uses less ammunition than indirect fire at longer ranges.

The last argument we may concede at once; but the compensating advantages of firing from covered positions further back more than outweigh the slight saving of ammunition. Guns so situated: (i) cannot be neutralized or destroyed by the same fire as is neutralizing or destroying the infantry in front. This is particularly important in defense;

(ii) can transfer their fire with greater flexibility to other sectors of the front;

(iii) can initiate or break off engagements with greater freedom;

(iv) can more easily be supplied with ammunition since, in spite of the "all round fronts" of modern warfare, supplies still come up from the rear; and

(v) can form the core of the middle area of the defense in depth lay-out.

The suggestion that all indirect laying is aimed at areas not "actual targets" cannot, however, be admitted. It is true of *purely predicted* shoots, but, when the gunner can observe and correct his fire, he will always go for a direct hit if the dimensions of the target, the zone of the gun, and the time available justify the attempt. And in the absence of these conditions he will fare no better with direct laying.

As for "mumbo jumbo" and "complicated techniques," it may be pointed out that that sort of thing made possible the surprise barrages of Cambrai and of March 21st, 1918.

In the Libyan desert, Germany vainly installed some naval guns in an effort to stop the British.

There is, however, some justice in Miksche's general commendation of the "gunner officer—once so dashing and audacious—now become a geometrician, an over-theoretical mathematician." But this kind of decadence is not, at any rate in the British Army, as universal as he thinks.

The complicated techniques elaborated in peace-time have not, in fact, stood the test of modern war. And it may be claimed—or admitted—that the average British gunner prefers dashing about to doing sums. It is not without significance that a sentence in the pamphlet which modified the ritual of the Stages begins: "This, no doubt welcome, change . . . ."

While, therefore, it would be undesirable, for reasons given, to adopt the "forward gun and open sights" policy advocated by Miksche, we can, by giving certain units a specialized role of close support for minor operations, provide increased scope for the dash and audacity of our gunners.

There must always be regiments to perform the routine tasks of defensive fire, program shoots, etc.; and they cannot be absolved from their "mumbo jumbo." But when the gap is made the special batteries can dash through and play at Horse Artillery. They can revel in "half-cock" positions and voice control OPs. They can, if they like, engage machine-gun nests over open sights—though they would be well advised to do so from beyond machine-gun range. But they should never lose sight of the principles:

(i) that the shell is their weapon;

(ii) that a troop in motion is four guns out of action.

Whether the ordinary field gun is a suitable weapon for this galloping role, or whether the 18-pounder or 75-mm would be better, is a question which cannot be discussed here. But we will not dismiss our special batteries before pointing out that they would form a powerful reinforcement to the antitank defenses of the division.

THE GERMANS AGAIN

But to continue with our study of the Germans—we have seen how they made no great success of the creeping barrage in March, 1918. Nevertheless this attack and the subsequent thrusts from the Lys to Chateau Thierry achieved remarkably deep and rapid progress. In fact, the Germans did better without the creeping barrage than the Allies had done with it.

It was natural, therefore, that they should lose interest in barrages and should devote their attention to the infiltration tactics which had proved so effective in piercing our defenses. They discovered also, later in the year, that tanks were not freaks but practical weapons which could profoundly influence, or even force, the decision.

These were the two lessons on which the Reichswehr brooded during the years of peace. The Treaty of Versailles restricted their artillery equipment; but that only freed them to devote themselves without distraction to perfecting their infantry infiltration tactics, which were not dependent on artillery support.

The Treaty also debarred them from the practice of tank tactics, but the theorizing they did has been proved good by results.

Their artillery methods, however, seems to show no development. The Russian Colonel Malitsky has recently described the German methods on the Eastern front. "Artillery preparations," he says, "consist of moving fire at intervals of 100 to 150 meters. Such fire is kept up to a depth of 3 or 4 kilometers, repeated several times and concluded with an artillery attack on the main line of resistance."

What is this but the old "area strafe" of 1917?

It seems, then, that German gunners, though technically well equipped, are tactically still in the Napoleonic stage. They aim at the annihilation of the enemy by concentrations.

It is true that their manuals suggest a secondary object, which is to stun the defenders and make them temporarily incapable of using their weapons. But this is but a slight refinement of the bludgeon stroke.

For close support they still adhere to the open sights methods to which, as has been shown, grave exception can be taken. They have tried to strengthen their case by introducing the semi-armored self-propelled "assault gun." But to this the British gunner will find objections on other grounds.

As for Stukas, the "modern artillery," it is now generally recognized that the striking successes which they have scored will not be repeated and that, perhaps, they should never have been scored at all. The fact, however, that the Germans used this substitute is additional proof of their lack of interest in artillery tactics.

CONCLUSION

The general trend of this article has been to criticize the Germans for the concentrations methods of their field and medium artillery and for the open-sights methods of their close support guns. But certain conditions on the opponents' side provide favorable ground for the success of these tactics. These may be indicated by considering the following points:

(i) Concentrations are most destructive against troops who are massed in well-defined localities.

(ii) When the aim is neutralization by stunning, the German procedure is likely to be to neutralize one of two mutually supporting localities while the other is attacked; or, better still, to neutralize both localities while infantry or tanks infiltrate between them.

(iii) When the localities are thus outflanked their destruction can be undertaken. Down come the concentrations again, and, under cover of them, close support weapons are brought up to open positions at short range.

There seems to be a moral to this—for hedgehogs!

The general moral, however, is that since British artillery tactics have been, on the whole, sounder than German, it would be a mistake to abandon ours and adopt theirs. The British method of *attacking the position which is being neutralized and while it is being neutralized* is likely to surprise the enemy.

We cannot, perhaps, except with six months' battle experience, train our infantry to follow less than 100 yards behind the barrage. But we have carriers. These can hang back 200 yards behind the barrage and yet, when the lift comes, can cover that space in half a minute. And we can crowd quite a few extra men on to the carriers to form the first wave.

Aspects of Artillery Tactics

THE EMPLOYMENT OF CORPS ARTILLERY

1. GENERAL. *a*. Organic artillery consists of a headquarters and headquarters battery, and a field artillery observation battalion. The corps artillery headquarters is commanded by a brigadier general. There are no organic corps artillery gun or howitzer units. These are attached from higher echelons when available and necessary.

b. The methods of employment of artillery attached to a corps are flexible and depend upon the particular situation. Reinforcing artillery allocated to a corps by a higher headquarters may be attached to the divisions of the corps; a portion may be retained by corps and the remainder attached to divisions; or all may be retained under the immediate control of the corps. At no time should control of reinforcing artillery be centered in corps unless division fronts are so narrow as to make mutual support practicable. Any reinforcing artillery attached to a corps and retained under corps control is corps artillery.

2. EMPLOYMENT OF CORPS ARTILLERY. *a*. It is essential that corps artillery be employed early in the action. Attaching all or a part of the corps artillery to the divisions is therefore usual. Such attachments include elements from the observation battalion (survey, flash ranging, and sound ranging), and additional headquarters, as well as gun and howitzer units. Corps artillery or portions thereof should be attached to divisions when:

(1) The corps commander, through his corps artillery officer, cannot control the corps artillery owing to lack of positive communication means.

(2) Elements of the corps artillery are beyond mutual supporting distance, so that their fires cannot be massed in a common area.

(3) A particular division(s) has a mission that requires reinforcing artillery and the division(s) can better control this artillery.

b. Fire power achieves its maximum effectiveness when employed with surprise effect and in mass. Therefore control of artillery fire power should be constantly sought and centralized in the hands of the highest commander who can control it. When positive communication means between two or more artillery units are established, when two or more artillery units are within mutual supporting distance, when a lower echelon cannot control the fire power more effectively than a higher echelon, artillery fire power is employed under centralized control. This is a progressive process from two or more batteries, battalions, and divisions, up to the corps. Conversely, control of fire power is immediately decentralized when the above conditions cannot be met. Thus supported troops can always be furnished the maximum of artillery fire power at the disposal of the commander in the particular situation. Field artillery is decentralized for movement, supply, and training, as for example its use with combat teams. However, the ultimate effect desired—namely, the effect of fire power—can be more efficiently employed under centralized control.

c. In determining the amount of corps artillery to attach to the various divisions the following factors must be considered:

(1) The enemy opposition anticipated.

(2) The prospective employment of the division.

(3) The road net available and the march formations of the divisions.

(4) The terrain in the prospective combat areas.

3. EMPLOYMENT OF THE FIELD ARTILLERY OBSERVATION BATTALION AND ITS ELEMENTS. *a*. The field artillery observation battalion, or elements, may be attached to divisions, or the battalion may be employed under corps control.

b. The corps artillery observation battalion can furnish two observation-battalion detachments. Each of these detachments consists of two flash-ranging teams and one sound-ranging section. Attachments to divisions are made variously, as dictated by the situation. The following is an example of the usual manner of employment of the detachment by the division artillery commander: The flash-ranging teams are attached to the light artillery battalions in two of the division combat teams for the purpose of assisting the artillery in the adjustment and observation of fire and to collect combat intelligence for the division commander. The sound-ranging section is employed with the medium artillery for counterbattery.

c. The detachment listed above is considered the minimum for successful operation with a division artillery. At times it may be desirable to reinforce this detachment with survey and additional command and communication personnel.

4. STAFF ATTACHMENTS. In addition to the above, the corps artillery commander may attach intelligence and operations personnel from his staff to the divisions to assist in the organization for and conduct of counterbattery. The early functioning of the corps artillery staff also permits the corps artillery commander to keep abreast of the situation and to centralize control rapidly when the situation demands.

5. PURPOSE OF ATTACHING. Attachments from the corps artillery give the division artillery commander a ready and powerful means of gaining ascendency over the hostile artillery in the early stages of the engagement without diverting his organic units from missions in close support. Artillery in direct support must not be diverted to other missions when the supported unit is closely engaged with the enemy. Hence the necessity for attaching ample reinforcing artillery.

6. MISSIONS. *a*.Reinforcing artillery units attached to the divisions become division artillery and are employed as such.

b. Reinforcing artillery when employed under corps control executes three general fire missions: Counterbattery, long-range fires, and reinforcing the fires of the division artillery. Counterbattery is the primary mission. Air observation is nearly always essential. In addition to observation furnished by the organic field artillery airplanes, air observation should be furnished, upon request, by high-performance aircraft from an observation squadron, because the organic field artillery plane operates in rear of the friendly lines. Until such time as the observation battalion detachments are ready to function, air observation is practically the only means available for locating hostile batteries. The primary missions for observation by a high-performance airplane will be: Registration and adjustment of long-range artillery, reconnaissance of areas not covered by the observation battalion, verification of information obtained by the observation battalion, and surveillance of fires.

7. POSITIONS. *a. Attack*. In the attack the corps artillery, in common with all other field artillery units, occupies positions well forward, since it must usually cover the forward displacement of the division artillery.

b. Defense. Corps artillery is echeloned in depth to provide flexibility of fire and to permit continuity of support in case artillery in forward positions is forced back by local successes of the enemy. Gun units are given priority in choice of positions.

8. EMPLOYMENT OF FIRE POWER. There are three general methods by which the bulk of the corps artillery fire power may be made available in critical areas at critical times. A combination of these methods is usually employed. The methods are:

a. Attaching units of the corps artillery to appropriate divisions, as for example, the division(s) making the main effort.

b. Assigning to specific corps artillery units the missions of general support and reinforcing the fires of division artillery supporting the main effort or the critical sector.

c. Arranging the lateral coordination (zones of fire) of the corps artillery units so that the bulk of the fire power may be placed, on call, in the zone of action of the unit making the main effort or in other critical areas. The accomplishment of this normally requires some sacrifice of range in order to attain the desired lateral control.

9. SURVEY. Appropriate survey elements from the observation battalion should be included as a part of the detachments mentioned in paragraph 3, above, or should be pushed well forward independently for the purpose of assisting and coordinating the survey of the division artillery and establishing a common survey control for all, or any part of, the artillery with the corps. The type of common survey control established ordinarily will depend upon the amount of survey control available in the area coupled with the type of firing charts which are to be used. Each battalion executes its own survey in order to expedite the early massing of the fires of its batteries. As higher echelons complete their survey, all units are progressively placed on a common survey control.

10. OBSERVATION. Corps artillery units, especially when reinforcing the fires of divisional artillery units, have a need for observation in proximity to the leading supported elements. This need is particularly pressing in terrain that affords limited observation. Corps artillery units, therefore, send out forward observers. The functioning and communications of forward observers from corps artillery units that have a reinforcing mission must be coordinated with those of the division artillery forward observers that are operating in the same areas. When corps assumes centralized control of the corps artillery, the corps artillery commander must coordinate terrestrial, air, and flash and sound observation on the corps front.

11. LIAISON. The normal principles of liaison are applicable to corps artillery units. A corps unit reinforcing the fires of another unit sends a liaison officer to the headquarters of that unit.

12. CORPS ARTILLERY MISSIONS DURING THE ARTILLERY PREPARATION PRECEDING A COORDINATED ACTION. *a*. An artillery preparation is an intensive system of fires that is delivered immediately prior to the attack. The fires are usually prearranged as to both location and time.

b. Artillery preparations are usually divided into phases in order to concentrate on particular types of targets at critical times. Preparations are not stereotyped. Number of phases, lengths of phases, and fire missions are varied to fit the particular situation.

c. The corps artillery, reinforced as necessary by the artillery of other echelons, gains ascendancy over the hostile artillery early in the preparation. Neutralization of hostile batteries is maintained during the later phases.

d. The mission of corps artillery units during all phases of the preparation, when not required for counterbattery missions, is to reinforce the fires of division artillery in neutralizing hostile command and communication systems, defensive areas, and observation.

13. SUPPORTING FIRES DELIVERED BY CORPS ARTILLERY DURING ATTACK. The corps artillery continues counterbattery; reinforces the division artillery concentrations; neutralizes known defensive areas

beyond those neutralized by division artillery; blinds enemy observation.

14. CORPS ARTILLERY MISSIONS IN THE DEFENSE. *a. Fires delivered before enemy forms for attack*. Counterbattery; support of advanced covering forces and outposts; neutralization of hostile reserves; interdiction; harassing fires.

b. Missions in counterpreparation. Primarily prearranged counterbattery, with certain units having the additional mission of attacking enemy batteries discovered too late to be included in prearranged fires. Other corps artillery missions are: Neutralization of tank assembly areas, infantry assembly and reserve areas, and the enemy system of command; reinforcing the fires of division artillery.

c. Fires to break up attack after it is launched. Counterbattery; neutralization of hostile mechanized elements and reserves; reinforcing the fires of division artillery; and blinding enemy observation.

15. CORPS ARTILLERY MISSIONS IN RETROGRADE MOVEMENTS. Execution of long-range interdiction fires with special attention to hostile movements toward the flanks and rear; neutralization of distant targets; reinforcing the fires of artillery in direct support in accordance with the situation.

16. CORPS ARTILLERY FIRE DIRECTION. Corps artillery battalions shift and mass their fires by the same methods used by division artillery. The technical handling of corps artillery is almost identical with that of division artillery. Because of their wide zones of fire, corps artillery battalions may frequently maintain two firing charts. Corps artillery battalions attached to divisions are furnished survey control by the division artillery survey officer of the division to which attachment is made.

REINFORCING ARTILLERY EMPLOYED IN MASS
(THE ATTACK OF AN ORGANIZED POSITION)

17. GENERAL. *a.* The term *reinforcing artillery* applies to such additional artillery as may be attached from a higher unit to a lower. Examples:

(1) Artillery units attached by corps to divisions as in paragraph 2b, above.

(2) Large quantities of artillery attached to a command as required for a particular operation. Such attachments are especially indicated in the attack of a strong defensive position. The following paragraphs refer exclusively to this type of situation.

b. Commanders of reinforcing units must be aggressive in starting reconnaissance and in utilizing their own means for securing missions and battlefield intelligence. The more rapid the action, the less the aid which may be expected from units already committed.

18. CONSIDERATIONS INVOLVED IN ATTACHING LARGE AMOUNTS OF REINFORCING ARTILLERY. When large quantities of reinforcing artillery are to be attached to a command, several complex problems arise. Among these are:

a. The requirements in weapons, additional headquarters, and ammunition.

b. The time and space factors that will control the movement of the units and ammunition to their respective areas of employment.

c. Tentative allocations to subordinate echelons, based on the estimated requirements.

d. Final allocation to subordinate echelons, based upon the reinforcing artillery and ammunition actually allocated by higher headquarters.

e. Determination of the priorities of arrival and of occupation of position by the reinforcing units.

f. Preparatory work to be done, by units now in position, to assist reinforcing units in getting ready to fire.

g. Arrangements for receiving and maneuvering the reinforcing units upon their arrival in the combat zone.

h. Coordination of all field artillery observation means.

i. Release of the reinforcing units at the time designated by the higher headquarters.

These matters are discussed separately in the paragraphs immediately following.

19. REQUIREMENTS IN WEAPONS, HEADQUARTERS, AMMUNITION. A correct determination of the requirements in weapons, additional headquarters, and ammunition for the support of a particular operation is reached through careful calculations made by the artillery commander and staff of the senior echelon present. The commander considers first the plan of attack, second the general and special missions that must be accomplished. The special missions include specific missions ordered by the commander, counterbattery, and missions that require super-power artillery. The calculations for the ammunition requirements must be made concurrently with the requirements for the weapons and the additional headquarters.

20. TIME AND SPACE CONSIDERATIONS. When the estimated requirements are determined, the artillery commander, in cooperation with the general staff, determines whether the available time and the road and railroad nets available to bring the reinforcing units and their ammunition into the area will permit completion of the movements. A careful study of the ammunition transportation that can be made available from units already present is a pertinent consideration.

21. TENTATIVE ALLOCATIONS TO SUBORDINATE ECHELONS. The calculations being completed, the artillery commander makes a tentative organization for combat, based upon his estimates, in order to determine the allocations to subordinate echelons. His estimate provides for the retention under his immediate control of the minimum amount required to accomplish the missions envisaged. The remainder of the reinforcing artillery requested is tentatively allocated to the several subordinate echelons. In making the allocations to subordinate echelons the factors to be considered are: The fire power needs of these units to accomplish their missions; the particular unit's ability to command additional artillery; position areas available; and routes of access.

22. FINAL ALLOCATION TO SUBORDINATE ECHELONS. When higher headquarters announces the amount of reinforcing artillery and ammunition that will actually be made available, the artillery commander and his staff revise the tentative allocations and plan, with the general staff, the movement of the reinforcing units to the combat zone.

23. ORDER OF ARRIVAL. The order of arrival of reinforcing units is basically dependent upon the cover and concealment available at or near position areas. It may also be affected by the prospective employment of certain units. The order of arrival is normally scheduled according to the following priorities:

a. Those batteries or battalions that can go directly to their battle (alternate) positions owing to the fact that cover and concealment are available.

b. Those batteries or battalions that can go to areas affording concealment in the vicinity of their battle or alternate position.

c. Those batteries or battalions that must be brought in as late as possible owing to lack of cover and concealment, either at their positions or in the vicinity thereof. This group must be reduced to the absolute minimum. Careful planning and the cooperation of all commanders and staffs are essential.

24. ASSISTANCE RENDERED BY UNITS IN POSITION. Specific units already in position are directed to make maximum preparations for specific reinforcing units. This assistance may include selection of positions and observation posts; establishment of wire communication; survey; preparation of firing data; and, when practicable, the transportation of ammunition. Such preparatory work must be done intelligently and thoroughly and requires responsible supervision. Commanders of incoming units are responsible that they or their representatives arrive on the ground and start supervision at the earliest possible moment.

25. ARRANGEMENTS FOR RECEIVING UNITS. Arrangements are made to receive the units upon their arrival. These arrangements must be complete and detailed. Among matters to be covered are the following:

a. Arrangements for quartering and feeding advance detachments.

b. Selection of staging areas.

c. Determination of the routes of advance to final positions.

d. Determination of dates and times for the occupation of positions.

e. Information for the incoming units, to include locations of gun positions, observation posts, and command posts, names of local commanders with whom they will deal, codes to be employed, radio frequencies to be employed, wire communication already established, wire communication to be established by the incoming unit, locations

of local ammunition dumps, amounts and types of ammunition available to the individual units (this data should include the lot numbers), preparation of firing charts, and local orders covering the requisition and receipt of all classes of supplies.

26. COORDINATION OF ALL FIELD ARTILLERY OBSERVATION MEANS. The presence of many field artillery units in a given area requires that all field artillery observation means be coordinated by the senior artillery commander. The available terrestrial observation points must be allocated, the limited air observation means assigned appropriate missions, and the flash and sound units coordinated as to zones of primary responsibility.

27. RELEASE OF REINFORCING UNITS. The artillery commander makes arrangements to insure that reinforcing units are released at the time designated by higher headquarters. Such arrangements include instructions as to date and hour of release, disposition of this artillery in accordance with the directive from superior headquarters, the time at which it will move, and the routes to be used.

28. REINFORCEMENTS FOR DEFENSE. In general the considerations outlined in paragraphs 17-27 will apply when determining the artillery requirements for conducting the defense of a position.

THE FIELD ARTILLERY ESTIMATE

29. GENERAL. Every military operation should have a definite aim. All missions incident to an operation are contributory to this end. A commander's *mission* as conveyed in orders or instructions from higher authority should require the adoption of a definite course of action in meeting the situation which confronts his command. The course of action adopted should be the result of a sound decision. *A sound decision results from a timely and proper estimate of the situation* (FM 101-5).

30. PURPOSE. The purpose of the estimate is to insure that the commander will give due consideration to all factors affecting the situation, and to the enemy capabilities (lines of action which may interfere with the accomplishment of his mission), to the end that he may adopt a line of action which:

a. Favors the accomplishment of his mission.

b. Offers the best prospects of success.

If more than one line of action meets these requirements equally, that one should be adopted which most favors future action (FM 101-5).

31. THE ROLE OF THE SUPPORTED ARM (INFANTRY). The infantry is essentially an arm of close combat. Its primary mission in the attack is to close with the enemy and destroy or capture him; in defense, to hold its position and repel the hostile attack. Infantry fights by combining fire, movement, and shock action. . . . Its offensive power decreases appreciably when its freedom of maneuver is limited or when it is confronted by an organized defensive position (FM 100-5).

32. THE ROLE OF THE SUPPORTING ARM (FIELD ARTILLERY). Field artillery contributes to the action of the entire force through the fire support which it renders other arms (FM 100-5).

33. BASIC CONSIDERATIONS OF THE SUPPORTED AND THE SUPPORTING COMMANDERS. The nature of the missions of the supported arm and of the supporting arm demonstrate that the infantry commander thinks, *primarily*, in terms of maneuver (the maneuver factor); the artillery commander thinks, *primarily*, in terms of fire power (the fire power factor).

34. THE ESTIMATE OF THE SITUATION. The correct estimate of the situation can be arrived at only by a judicious consideration of both the fire power factor and the maneuver factor. Although both factors are always pertinent, their relative importance will vary with the general conditions of troop employment at the particular time, at the particular place, and in the particular situation.

35. RESPONSIBILITY OF THE ARTILLERY OFFICER. The artillery officer in each echelon of command has a dual role. He commands the artillery of the echelon and, in addition, he is a member of the special staff of his commander. In the latter role he must always be prepared to submit to his commander technical and tactical advice relative to the employment of the artillery. This duty dictates that the artillery officer make a continuous estimate of the artillery possibilities. His estimate cannot be exclusively parallel, along purely artillery lines, to the estimate of the situation being made by the commander. On the contrary it is coincidental with and complementary to the latter. The staff of the artillery officer maintains continuous contact with the general staff sections to learn the lines of acion under consideration by the commander and the lines of action the commander considers open to the enemy.

36. THE FIELD ARTILLERY ESTIMATE. *a*. In general, the artillery officer prepares an estimate for each phase of an operation. During an offensive situation the estimates may be:

(1) The field artillery estimate prior to the basic decision (the reconnaissance phase).

(2) The field artillery estimate after the basic decision has been made so as to arrive at the complete decision (the contact phase).

(3) The field artillery estimate after the complete decision has been announced (the plan phase).

b. The main consideration to the artillery officer while making his several estimates is: What will be the artillery missions? Regardless of the phase of the operation he constantly seeks answers to the following questions:

(1) What types of targets (and the number of each) does the situation present?

(2) What are the lines of action open to the commander?

(3) How can the artillery fire power be best employed to reduce the targets presented?

(4) Does the number of targets (actual or estimated) indicate that the field artillery means at hand are adequate? If not, what reinforcements are required?

c. The estimates for the reconnaissance and the contact phases are made on broad general lines and point toward a solution of *what* should be done; that for the plan phase is concerned with *how* it should be done.

37. APPLICATION OF THE PRINCIPLES *a. General situation*. Red and Blue are at war.

b. Special situation. (1) Red has invaded Blue territory with a force estimated to be an army corps.

(2) The Blue I Army Corps, reinforced, is advancing to meet the invader, with the mission of seizing an indicated terrain objective.

(3) Organization of the opposing forces is similar except that the organic infantry strength of Blue is as 4 to 3 over Red.

(4) Prior to contact the artillery officer and his staff are engaged in a continuous study of the terrain in the direction of the enemy, with special consideration of those areas in which the time and space factors evidence probable contact, and of the lines of action under consideration by the commander.

c. The field artillery estimate—reconnaissance phase. (1) The artillery officer and his staff examine, in general, each line of action open to the commander and the opposing lines of action open to the enemy with respect to:

(a) The artillery missions to be accomplished.

(b) The artillery support required.

(c) The amount of artillery available. If insufficient, the reinforcements necessary.

(d) The *general* nature of the terrain, to include consideration of concealment, routes, areas favorable or unfavorable for positions, the direction and depth of the observation available, the time and space factors as dictated by the terrain.

(e) Like considerations in the event of displacement.

(f) The status of the artillery ammunition supply; locations for ammunition supply points. What is the time element for a turnaround; is the road net ample, restricted, or impracticable?

(2) A field artillery estimate having been completed for each line of action under consideration, and each estimate having been weighed against the advantages and disadvantages of the others, the artillery officer is prepared to make his recommendations as to the best means of employing the artillery fire power available. Every new item of information received must be carefully examined to ascertain whether or not it dictates a change in the estimate.

d. Special situation, continued. (1) Contact has been gained; the situation is partially developed.

(2) The commander, after a consideration of his mission, the combat intelligence reports, and the estimates of the situation, to include those of the maneuver factor and of the fire power factor, announces his basic decision.

(3) Decision: "To attack when the situation is developed."

(4) Directive: "Essential elements of information: XXXXX; prepare plans, in the following priority:
(a) Envelopment of the hostile right flank.
(b) Envelopment of the hostile left flank.
(c) A penetration."
Lines of action (a) and (b) are basically dependent on the maneuver factor; line of action (c) is basically dependent on the fire power factor.

e. The field artillery estimate—contact phase. (1) The artillery officer and his staff must now make an estimate with the view of assisting the commander in arriving at his complete decision. To arrive at a logical conclusion the artillery commander and staff must constantly place the fire power factor in intimate relation to the maneuver factor for each line of action under consideration.

(2) The following are appropriate subjects for consideration:
(a) What specific artillery missions are presented?
(b) Does the situation dictate an artillery preparation as a feature of the fire power factor for neutralization; or is an artillery preparation advisable as a diversion to assist the maneuver factor; or is a preparation undesirable?
(c) Does the known information of the hostile position, the weapons available, the ammunition supply, the required duration of the preparation in view of the targets to be attacked, the rate of fire of the weapons, and the necessary time element between missions indicate that a suitable preparation can be fired?
(d) What percentage of the artillery should be committed in rear of the main and secondary efforts?
(e) Is it practicable to support the main effort *positively* by emplacing the bulk of the artillery in rear of the secondary effort and thus favor the entire action?
(f) What time element is being projected for the development of the command; for the attack after the development? Are these time factors practicable so as to insure the artillery deployment and the delivery of ammunition to support the attack?
(g) Will terrestrial observers satisfy the demands for observation? What air observation in excess of the organic field artillery air observers is available? How should it be assigned?
(h) What methods will be employed to lift the fire?
(i) Does the estimate indicate that the artillery officer should recommend a line of action not now under consideration?

(3) The several artillery estimates having been completed, the artillery officer is prepared to furnish the tactical and technical advice to his commander that will clearly evidence the degree to which the field artillery can support each of the contemplated lines of action. Thus the commander is permitted to apply the available fire power factor to the maneuver factor under consideration and to arrive at a tactical decision that must be sound.

f. Special situation, continued. Decision: "To envelop the hostile right flank, from the vicinity of X, at ———, to seize the terrain at Y."

g. The field artillery estimate—plan phase. (1) The artillery commander has the express task of apportioning his means to support the decision of the commander. His decisions will include tactical and technical considerations. For the purpose of this discussion an *arbitrary* classification between tactics and technique places the organization for combat and the selection of the artillery positions in the sphere of tactics. The following lists comprise the pertinent factors that an artillery commander will consider in formulating his plan. An inexperienced commander may employ this as a check list of items to be accomplished successively, whereas the experienced field artilleryman should combine many of the factors for simultaneous consideration.

(2) *Tactical considerations*. (a) *Organization for combat. Command:* The artillery organization for combat is planned on three basic considerations, namely: The missions to be executed; the maintenance of artillery headquarters in command of their organic units to the greatest extent practicable; and, when necessary to form groupments particularly for the execution of direct support missions, the placing of an organic artillery commander in command rather than the commander of a reinforcing unit. The latter factor permits the essential continuity of command liaison between infantry and artillery commanders. Frequently the formation of groupments can be avoided by assigning the reinforcing unit (especially if it exceeds one battalion) the mission of general support and of reinforcing the fires of the organic unit. The detals to be considered are: Allocations, attachments, groupments. *Missions:* What artillery missions have been expressly ordered, such as a preparation, the massing of fires in certain areas, the blinding of observation, etc.? What general artillery missions are evident to the trained artilleryman, such as minimum range line, distant range lines that the several types of artillery must be able to reach? What percentage of the means available will support the main effort? Can the remainder of the means properly support the secondary effort? Units to be in general support; reinforcing missions to be assigned? Where are the critical terrain areas in the zone of action of each attack? Can contingent zones be arranged so as to give prompt additional fire support in those areas? What percentage of the fire power available will be assigned to each of these areas? What is the relative strength of the opposing artillery forces? What is the counterbattery problem thus presented? Does the situation indicate the desirability of supplementing artillery fire power by combat aviation?

(b) *Positions*. Can the attack be supported from present positions? Do the positions selected permit the assignment of the desirable contingent zones?
Are the positions favorable for: Concealed routes; concealment and cover at the positions; survey; communication; antimechanized defense; ammunition supply?
Does time permit the occupation of positions?
Are suitable routes for displacement available?

(3) *Considerations of technique*. What maps or map substitutes are available?
Plan of survey?
Restrictions as to registration, if any?
Details of the artillery preparation; its duration and phases?
Does the situation require restrictions on fires, laterally or in depth, for the protection of the enveloping force?
What is the observation situation:
Air—assignment of planes available?
Terrestrial—necessary coordination to include assignment of areas for observation posts, when appropriate; assignment of zones of observation; employment of the field artillery observation battalion?
What coordination is required with plans for the employment of armored units or airborne troops?
Supporting fires: Employment of staff to visit units and effect coordination?
Ammunition supply and resupply: Time length for a round trip; will transportation be pooled?
Nonstandard antimechanized or antiair protection, or defense against infiltration tactics?

38. CONCLUSION. The result obtained—the commander's complete tactical decision for the command as a whole—must be sound. It is believed that should the commander elect to pursue any policy in arriving at his decision other than the one which continuously places the factors of fire power and maneuver in stark relief so that their respective strength and weakness in each situation may be clearly evaluated, the decision may be said to have been arrived at by the laws of chance. Trial and error are not recognized as successful battle principles.

ENLISTED MEN OF TANK DESTROYER UNITS

The arm of service of enlisted men receiving training in Tank Destroyer Replacement Training Centers and enlisted men assigned to Tank Destroyer units has been designated as Field Artillery.

CIRCULAR GFT FOR THE HEAVIES

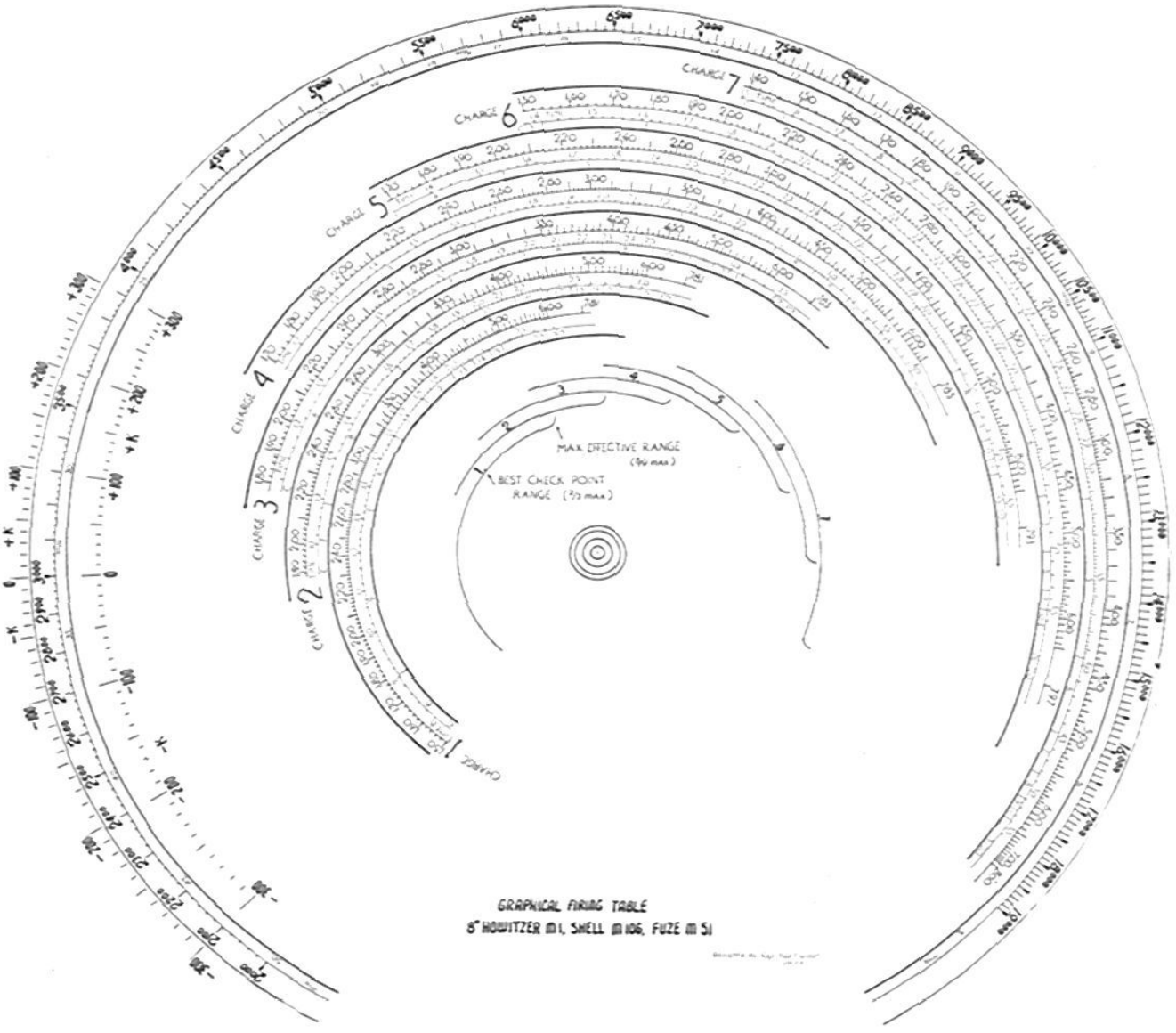
By Capt. Paul F. Wilson, FA

Heavy artillery, from the nature of the materiel, cannot deliver fire as rapidly as light artillery. However, the extra seconds required to service the heavies should not be increased by any additional delay at the fire direction center. By following light artillery in the use of the graphical firing table, heavy artillery can improve speed and reduce chance for error.

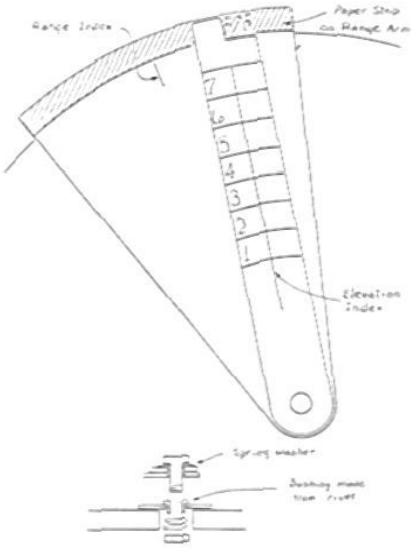
For most of the heavy artillery the GFT can be obtained only by "home construction." Accuracy at the longer ranges requires either a very long table or several tables, each of which covers a section of the range. A circular table provides a long range scale on a relatively small device, because the length of scale on its circumference can be 3 1/7 times the diameter—a GFT 10″ in diameter can have a 30.1″ range scale. Capt. Nathan M. Southwick devised a 105-howitzer circular firing table in an emergency, which worked very well (FIELD ARTILLERY JOURNAL, April, 1943, page 292). Our battalions of 8″ howitzers have been using a circular GFT since January; with it, within the effective range of any charge, the error of elevation reading is seldom more than a mil. "Home construction" of a circular GFT is easier than building a straight one. No slides are necessary for setting off a *K*.

By using two transparent index arms similar to those on an engineer's circular slide rule, the *K* can be set off without changing the relationship within the printed matter on the rule, so the complete table can be made on a sheet and reproduced photographically. Any shrinkage of the paper involves all scales simultaneously, so there is very little or no error.

All charges can be placed on the same table, allowing rapid change to the most efficient charge when the range varies too much to be covered with one check point and charge. A metal



slide or "Scotch tape" on the elevation arm can be used to hide all charges except that being fired, if such precaution is thought necessary.



A circular GFT has the disadvantage in that the *K* setting between the range index arm and the elevation index arm cannot always be read in yards per 1000. However, a scale is provided on the GFT at which the *K* can be read along the elevation arm when the range arm is placed at zero. A strip of paper on the outer edge of the range arm beyond the range scale can be pencil-marked along the elevation arm to indicate the *K* setting for each check point.

Care in constructing a circular firing table from a photo reproduction of the chart will produce a very accurate GFT. The photograph is stuck to a base of plywood or similar material. Shellac or lacquer will protect the photographic surface. A thin washer fastened with small screws over the center of the chart will serve to mount the arms; this washer should be carefully centered.

Range and elevation arms can be cut from 1/16″ celluloid. The range arm is made wide enough at the outer edge so that the narrow elevation arm will not be moved off the edge of the range arm in setting the *K*. This width also reduces the chance of accidentally moving the upper elevation arm in relation to the range arm.

The index lines on the two celluloid arms are shallow cuts filled with India ink or wax pencil. Cuts should be on the top side of the range arm and on bottom side of elevation arm. An extension of both index lines should pass through the center of the hole by which the arms are mounted.

When mounted, there must be pressure between the arms so they will not move freely in relation to each other, and yet will move together around the board. In the accompanying sketch the screw and nut are used to adjust the pressure between the arms, and the spring keeps the two arms in contact with the board.

SELF INSTRUCTION IN GUNNERY

BY COL. ERIC A. ERICKSON, FA

Follow this simple procedure, and you can easily become an expert in the conduct of observed fires of all types. You need no guns or gun crews, and no ammunition. Weather need not bother you; you can do this in bed, at your desk, while walking from your quarters to the orderly room, or while sitting in the club. All you need to do is to do it daily, and it need not take more than 5 or 10 minutes.

Here is a simple plan to follow:

a. Time—5 to 10 minutes daily, night or day.

b. Place—anywhere.

c. Equipment—in many cases you will need nothing, but training aids like a match box, paper and pencil, blackboard, trainer, and terrain board will help greatly. The big thing to remember is that you really *can* do this all by yourself. Use as a reference FM 6-40.

d. Personnel—no one but yourself, but groups of two or three additional officers will make it interesting. Use one officer to critique problem.

e. Have a tactical situation for each problem.

f. Make each problem illustrate one definite point. After a little practice, you can make one problem illustrate many points.

g. Remember the tactical situation decides your mission. The mission decides how you will attack the target. There are only two ways to attack a target—neutralize it or destroy it. If you decide to neutralize it, use a bracket adjustment; if you decide to destroy it, use a precision adjustment. In either case, be sure that you decide correctly. FM 6-40 will tell you how.

h. Here are some points to bring out in each problem. Bring out at least one, and emphasize it.

(1)Correct commands.

(2)Data—estimated, map, corrected, transfer, computed, etc. This decides your initial elevation and deflection, your initial range change, and your final bracket.

(3)Your target—is it clearly defined? stationary? does it have depth and width, and how much?

(4)Now, fire your problem and review your results.

You now have the foundation and the framework for your house of gunnery, as far as observed fires are concerned. If you follow the above procedure and practice daily, you will be able to knock over any target. Like the training of the men in your battery, all it takes is correct daily practice and personal interest on your part. You must do this if we are to defeat our enemies.

We Must Be Able to Shoot!

Rocket and Barometer Rapid Survey

By Col. Edward P. Hamilton, FA

Medium and heavy artillery today must be prepared to act in direct support as it did in Napoleon's time, yet it must also be able to revert to the deliberate and precise methods of 1918 and of El Alamein. Any gradation in between is a possibility for which we must be prepared. The one requires no survey, the other a survey of a degree of precision determined by the maximum accuracy of artillery fire. In the last war the French taught us that we must locate our target correctly within some ten to fifteen meters, but the present day battalion concentration probably allows a little more liberality. As for vertical control, the angle of fall for howitzers is such that an error in height of the target results in only once or twice that same error in range effect. In the case of the 155 gun the angle of fall would seldom be such as would give a range error of more than three times the vertical error. Now a theoretical error of 50 yds. at 9 or 10,000 yds. is surely negligible. By following this reasoning an elevation error in survey of up to some 15 yds. becomes of academic interest. Let us concede that an elevation error of plus or minus 10 yds. is allowable in our artillery survey. If the reader questions this let him consult his range tables and decide what error he will permit.

How is the average survey of the medium artillery usually conducted? With much planning, struggling, and shouting a control is carried forward to a point whence observations can be made in the enemy lines, and the accuracy attempted is of an order suitable for city planning or railroad work. The fact that such accuracy seldom is obtained does not alter the matter. Our direction, location, and elevation are carried forward at much expense of time, with the desire and hope of securing points within a yard or so for position and even closer for elevation. Our instruments are precise and so are our desires. Have we not, however, lost our sense of proportion and wasted vital time? With this in mind our brigade has for about a year been trying to simplify and speed up its survey, while still retaining a degree of accuracy suitable to the mission. This, of course, does not at all replace the normal survey which is carried on as usual when time allows.

In flat wooded country direction and location cannot be carried forward by traverse or triangulation with any speed, and last summer the brigade found itself in such a training area. The parachute ground signal appeared to offer a solution, so a few M-19 signals were borrowed from an armored division. One of these was fired from an OP and observed from the battalion area by aiming circles set on a relatively long base, say about 1/10 of the range. A second rocked fired later from one end of the base furnished a back azimuth when observed from the OP. This gave a known point and azimuth at the OP with respect to a point at the battalion place mark or relatively near it. Level was carried from this rear point to the OP by a small pocket aneroid barometer.

The initial difficulties were the failure of some battalions to set up a long enough base (a theoretical minimum short base is not sufficient), and imperfect synchronization of observations by the aiming circles. Ground signals were so scarce that only a single round was fired per observation, yet the results were most encouraging. The use of at least one orienting round is most desirable, particularly in daylight. Minor points to be watched are that the ground signal must be fired essentially vertically, and that in case of much wind a drift correction must be estimated and applied. This brigade has had no experience with the double star Armored Force rocket but it is not believed practical for us, particularly with the longer distances of the medium and heavy artillery survey. While most effective at night, these ground signals (particularly the white star parachute) are readily visible in bright daylight up to at least some four or five thousand yards, and probably much more if two or more signals can be fired. The height of burst is usually sufficient to clear any mask that will be met in flat country.

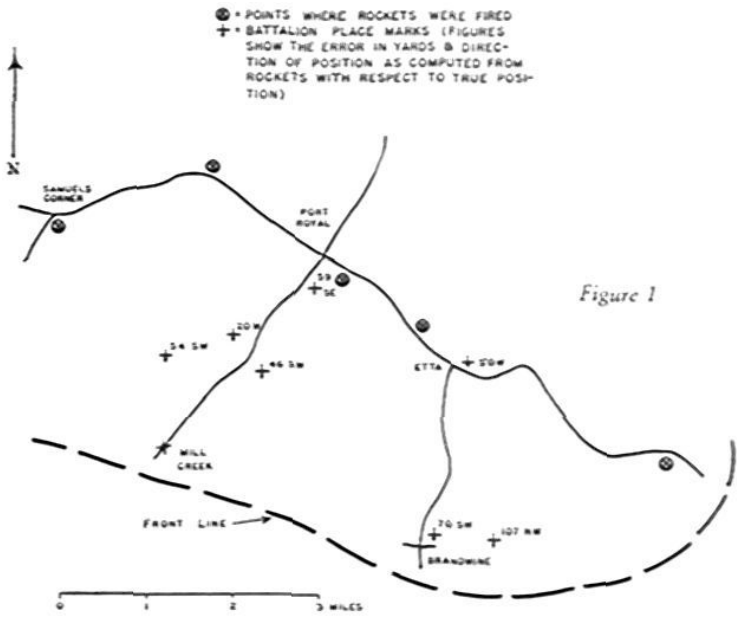


Figure 1

ROCKET & BAROMETER SURVEY

In connection with a field exercise held late in April, 1943, Lt. Col. Bradford Butler, Jr., suggested that we attempt a reported German use of the rocket in survey, by means of which a complete brigade survey control could be obtained throughout all battalions simultaneously. The brigade occupied a long and relatively shallow area and by normal survey established a long sound base and all battalion place marks (Fig. 1). All battalions were notified that at a certain time (after dark) five pairs of rockets would be discharged, each pair successively at ten minute intervals at five points whose coordinates were given. The instruments (aiming circles) were to be set up at points tied to the battalion place marks, and prepared to observe the azimuth of the point of ignition of the second rocket of each pair, the first acting as an orienting round only. Results of back azimuth and tracing paper resections were to be

reported as soon as complete. All battalions completed the work and reported the resulting coordinates within about twenty minutes after the last rocket was fired.

An observer at the point of discharge estimated the drift of the second rocket at moment of ignition, with respect to point of discharge. These drifts were later reported to battalions and corrected for, but a radio car with the rocket party could have avoided this extra work and delay by reporting the corrections immediately. A projector is being modified and mounted to discharge vertically with a trigger and lock mechanism, but even with this the wind will usually cause a material drift which should be corrected for.

Six battalions reported the results of seven rocket resections showing errors with respect to known coordinates ranging from 20 yds to 107 yds., averaging 58 yds. The observation battalion made four observations with transits, with errors averaging about 35 yds. Figure 1 shows the relative location of the rockets and of the battalion place marks, as well as the amount and direction of error at each point. Even with one battalion showing an error of 107 yds. it is believed that this survey is amply accurate enough to lay down initial fires of practical accuracy. The modified rocket projector and further practice in this method should result in still higher accuracy. Naturally this method does not in any normal situation replace usual survey methods when they can be used, but it does allow fire to be opened much sooner if needed. It bears the same relation to normal survey that radio does to telephone communication.

TABLE I

BAROMETRIC SURVEY

26 Apr. '43 Mean Temperature about 60° F
"Tycos" Short & Mason—2-inch Aneroid, Compensated,
3000 ft. scale (barometer bought in 1921)

Place	*Time*	*Elev.*	*Time Cor.*	*Elev. Cor.*	*Adjusted El.*	*Corrected for datum plane*	*Actual Elev.*	*Error*
Forward CP	0803	200	0		200	66	66	
Port Royal	0813	170	10 min.	+ 2	172	38	38	
Rollins Fork	0819	295	16 min.	+ 3	298	164	186	—22
Mill Creek	0824	175	21 min.	+ 5	180	46	54	— 8
Howards Corner	0834	320	31 min.	+ 7	327	193	223	—30
Rear Echelon	0907	295	1 hr. 4 min.	+14	309	175	205±	—30±
Dirt Bridge	0953	255	1 hr. 50 min.	+24	279	145	187.6	—43
Eubank Corner	0959	285	1 hr. 56 min.	+25	310	176	214.2	—38
Dirt Bridge	1042	250	2 hrs. 39 min.	+34	284	150	187.6	—38
Rear Echelon	1055	275	2 hrs. 52 min.	+37	312	178	205±	—27±
Broaddus	1114	295	3 hrs. 11 min.	+41	336	202	225	—23
Howards Corner	1122	285	3 hrs. 19 min.	+43	328	194	223	—29
Mill Creek	1155	140	3 hrs. 52 min.	+50	190	56	54	+ 2
Rollins Fork	1158	255	3 hrs. 55 min.	+51	306	172	186	—14
Port Royal	1203	130	4 hrs.	+52	182	48	38	+10
River Level	1206	100	4 hrs. 03 min.	+53	153	19	10±	+ 9±
Forward CP	1218	145	4 hrs. 15 min.	+55	200	66	66	

1218 — 0803 = 4 hrs. 15 min. = 4.25 hrs.
55/4.25 = +13 ft. per hour.
200 — 145 = +55 ft. *correction*.

It is now necessary in order to complete the survey to carry our level up to the battalions. For this we use an aneroid barometer in rapid survey; it is also of great value as an approximate check on level in more precise surveys. A good quality pocket aneroid two or three inches in diameter, if temperature compensated, is sufficiently accurate for the artillery survey. It is desirable that the dial should read from 0 to 3000 ft. Such an instrument in proper repair will, if held with dial level and carefully tapped and read, show an appreciable movement of the needle for a vertical movement of about 3 ft. Elevations can easily be read to 5 ft., and could be further interpolated except that such apparent accuracy would be a delusion. The writer has owned for some twenty years a small Taylor 3000 ft. barometer which has proved that it is consistently capable of showing altitude differences of 5 ft., time and distance being excluded, and a similar "Tycos" instrument recently bought by one of the battalion commanders shows the same capability. A 6000 ft. scale aneroid, such as is issued to some of the Topographical Engineer units, will not give such close readings but certainly should be accurate to about 10 ft. K&E surveying aneroids are sometimes found, both in the service and still available for sale; their accuracy is in the order of 2 to 3 ft. St. Barbara's Trust of Boston, an artillery trust fund established by Col. Francis T. Colby, FA, recently loaned this brigade a Paulin surveying aneroid. This instrument, constructed on a basically different principle, consistently shows differences in elevation of 1 or 2 ft. and has checked U.S.G.S. bench marks over a two or three mile course with that degree of accuracy.

The accuracy stated above does not include errors arising from imperfect compensation, change in barometric pressure at the initial point, nor variations in barometric pressure over an area, so that practical working accuracy is materially less. Generally speaking, however, a maximum error of plus or minus some 15 to 20 ft. with the small 3000 ft. pocket aneroid, perhaps twice that with a 6000 ft. scale instrument, and some 6 to 8 ft. with the Paulin, is about what can be expected in practice over distances of say 2 to 3 miles. In sub-zero weather instruments become sluggish and the temperature is beyond the range contemplated in the compensation. This may largely be overcome by keeping the aneroid in an inner pocket except when being read. Change in barometric pressure can best be corrected for by reading a second barometer at the starting point against a time schedule, but as we often have only a single instrument this may not be feasible. It has been found that by making an observation at the base and then returning there for additional observations at as many other times as is practical, a rough curve of altitude versus time at base can be constructed and a correction determined for each observation. Barometric variations over an area cannot be corrected for, but

TABLE II

BAROMETER SURVEY

Port Royal Area—April 30, 1943

Place	*Time*	*Actual Elev.*	*2″ Tycos*	*Adj. Elev.*	*3″ Taylor*	*Adj. Elev.*	*5″ Paulin*	*Adj. Elev.*
CP	0841		265		140		147	
Port Royal	0855	37.8	235		85		116	
Samuels Corner	0904	201.0	390	194	245	198	269	192
Samuels Corner	0926	201.0	395	202	240	193	270	194
Port Royal	0935	37.8	240		85		121	
Rollins Fork	0941	186.2	380	186	230	186	262	183
Mill Creek	0945	53.9	255	63	100	58	134	51
BMQ 120	0948	155.2	355	164	200	159	242	158
Port Royal	0956	37.8	250		95		112	
Brandywine	1020	186.7	395	198	240	196	264	192
Etta	1028	29.5	250	53	90	47	118	47
Port Royal	1036	37.8	250		100		121	
CP	1050		275		120		146	

SUMMARY OF ERROR (IN FEET)

Place	*2″ Tycos*	*3″ Taylor*	*5″ Paulin*
Samuels Corner	— 7	— 3	— 9
Samuels Corner	+ 1	— 8	— 7
Rollins Fork	0	0	— 3
Mill Creek	+ 9	+ 4	— 3
BM Q 120	+ 9	+ 4	+ 3
Brandywine	+11	+ 9	+ 5
Etta	+24	+18	+18
Extreme Error	31	26	27

they seldom should be serious.

Table I shows results and methods of computation for a rough barometric survey carried out by a single aneroid. It was done in connection with other duties so that the time involved was considerably greater than desirable. The distance involved was some twenty miles out, and a return of about the same distance. Pressure change at the starting point was assumed to have varied uniformly throughout the period and intermediate observations were adjusted accordingly. This shows the barometer under about the most unfavorable conditions, yet the greatest error recorded was 43 ft., somewhat outside the plus or minus 10 yd. error conceded earlier in this discussion. This error was at a station some 15 miles from the start, certainly much farther than the artillery survey would normally be carried.

Table II gives the results of a survey carried out over the area covered by the rocket survey (Fig. 1), using three types of barometers. It was made more rapidly and radiated out from the starting point, returning to it at intervals, with the result that the time and pressure correction was based on relatively short time intervals. Here all barometers show errors well within our assumed limits. The consistent error of all three barometers at Etta cannot be explained, other than by some short sudden local barometric change. In these tests only one quick reading was taken of each barometer before moving on to the next station, and no time delay was allowed for possible lag.

Combination of this barometric survey with the rocket survey established a very rapid and relatively accurate brigade survey control over the entire area. Grant that it was dependent upon the survey of the long base along which the rockets were discharged, and that the survey of this base would require several hours. In many cases the tactical situation would allow this, but if time were pressing this control base itself can initially be run in with rocket methods, either by observing rockets along the base from a stadia-determined base approximately at the center of and at right angles to the main base or by triangulating on rockets. Such a base with these methods can be constructed as easily (or more so) by night as it can by day. If a sufficient base has been provided, any reasonable number of battalions can be tied together for both line and elevation in an hour or two. The base itself can be constructed in about the same time by the same methods. As far as secrecy goes, the rockets are discharged from any desired points and do not in themselves reveal anything of definite value to the enemy.

TARGETS

Even in the open terrain in which Tunisian operations were conducted and which have afforded excellent terrestrial observation, targets are difficult to locate. "Machine guns in the vicinity of . . . ," a favorite target description at our service practices, seldom holds in combat. As a result, units have been employing smoke for screening purposes more extensively than contemplated and rolling barrages are being used. The latter also has the added advantage of keeping the infantry oriented on its objective.

The terrain must be scanned thoroughly and systematically by experienced personnel familiar with German tactical principles and methods of disposing troops, using an instrument of greater power than that provided by the BC 'scope. Some units have obtained and are using with good results the infantry's 20-power observing instrument. Perhaps the answer would be to provide each battalion with an observing instrument of the French type, which includes 13-23-30 power magnification.

German 81-mm mortars in particular have been difficult to locate. One division artillery commander, after making a terrain study, places some artillery fire on all favorable mortar locations, so far as possible. A cursory examination of two German defensive positions indicated that an extensive use is made of reverse slopes. One in particular included tunnels spaced along the reverse slope, with the spoil dispersed about the entrance.

PERIMETERS
in
PARAGRAPHS

(Based upon latest information available at date of writing, and subject to correction as more complete reports are received.)

By Col. Conrad H. Lanza

THE WAR AGAINST JAPAN, (May 11 to June 21, 1943)

RECAPTURE OF ATTU

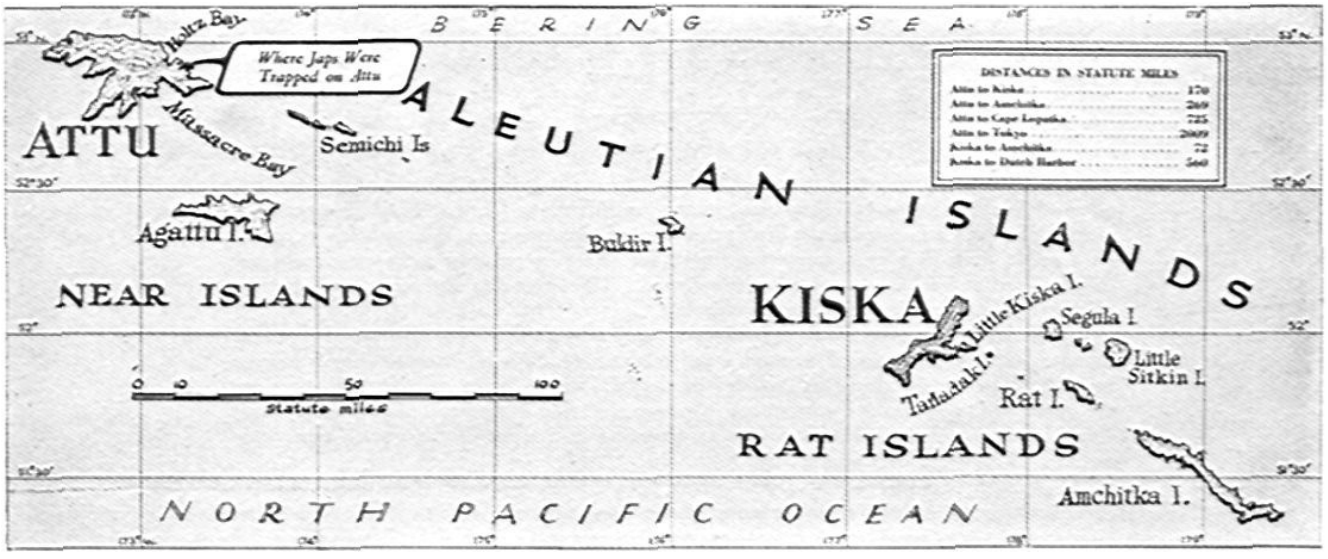
Attu is a small island at the extreme west end of the Aleutian chain. It has no resources of its own, and had a population of less than a hundred. In the early days of June, 1942 a hostile force of Japanese seized the island without opposition, and thereafter continued to hold it. According to a speech made by the Japanese Premier on June 16, 1943, the mission of the Japanese was to draw American forces to the north Pacific area. It did. American military, naval, and air forces were rushed north. A strong public demand arose for the recapture of Attu and its sister island of Kiska, seized by the enemy at the same time and under the same circumstances.

The enemy finding nothing at either Attu or Kiska, except harbors which needed development, proceeded to organize both islands. Kiska, the larger island, has a magnificent bay suitable for land planes. The Japs decided they could build fields, so started one for bombers on Attu and another for fighters on Kiska. Meanwhile, their air service used sea planes.

As both islands are covered with fog to an extraordinary degree, this enemy activity was not noted until this year. Thereafter the islands were bombed vigorously at every opportunity. American bases were gradually but steadily extended westward until by March, 1943, an American air base was functioning on Amchitka Island, only 80 miles from Kiska but nearly 300 from Attu. Thereafter Kiska was bombed almost regardless of weather, sometimes as often as ten times in one day. A part of the Canadian Air Force aided the U. S. Air Force. Attu was bombed less frequently. The enemy observed American activities by observation flights, but otherwise was not active in military operations. He worked straight on improving his bases, and at Kiska is believed to have succeeded in placing much of his establishment underground. For this reason, and because air photographs and other reports showed that the enemy was stronger on Kiska, it was decided to undertake the recapture of Attu.

An infantry division under Maj. Gen. Eugene L. Landrum was detailed to make the attack. It was to be supported by air forces of the army and navy, and by naval surface forces. The enemy was holding the east end of Attu, with main force and base at Chichagof Harbor. Some 4 miles west of here, on the north side of Holtz Bay, he was constructing his air field. The total enemy force, including labor troops and services, was about 2,500 men.

Our initial attack was on May 11th. The plan was to land on Holtz Bay (on the north side of the island) and simultaneously in Massacre Bay (on the south side). The two bays are opposite one another, about 5 miles apart, and connected by a pass between two hills.



At 0200, during a dense fog, the Navy started an artillery preparation on Holtz Bay, Massacre Bay, and Chichagof Harbor. The Air Force aided by a strong bombing program. This attack appears to have taken the enemy by surprise. In Holtz Harbor the enemy returned the fire, but apparently without much effect for shortly afterward American landing parties arrived on the beach. There was still fog everywhere. The Japanese counterattacked the Americans immediately, and very severe fighting developed. While this was going on more Americans landed, but at a different spot on the bay; these were also attacked. At the end of the day the Americans held two small beach-heads, not over ¼ mile deep and separated from each other by enemy forces.

The attack in Massacre Bay came at a later hour. Its first wave appears to have lost heavily from enemy mortar fire, but there were only small enemy forces in this area. The second landing wave got ashore without much difficulty and, finding little opposition, advanced inland. It made about 3 miles before the Japanese found enough troops to resist, near the summit of the saddle in the pass. Our two forces were now about 2 miles apart, with the enemy between them. The 3-mile beach head at Massacre Bay, coupled with the fog, afforded space for debarking the artillery and supplies; they therefore followed swiftly.

A demonstration which might have been turned into a serious effort, was made this date in Sarana Bay, on the southeast end of Attu. Only about one company of infantry appears to have taken part in this affair, which was not pushed.

On May 13th the Americans, having landed quite a large part of the division, started to enlarge their positions. Attempts were made to advance the separated beach-heads toward each other, and at the same time to enlarge them in the direction of Chichagof Harbor. More progress was made in the latter mission, but not so much as to clearing the pass between Holtz and Massacre Bays. The Japanese fought back hard, and according to their accounts lost 2/3 of their forces present in

Americans survey the scene of wreckage where strong Jap installations in the Holtz Bay area were shelled and fought into submission. A few tents are shown, but most Japs lived in underground dwellings which dot the area and in caves (black spots) along the cliff. Roof of Jap warehouse can be seen left, center. Most of the fighting was in rugged, precipitous terrain like this.

Where Attu is level it is boggy like all Arctic wastes, where the tundra turns to marshland as soon as it thaws. This made it hard to manhandle 105-hows., and foxholes quite uncomfortable. Aleutian fogs reduced visibility nearly to zero.

line. After night—not very dark in this latitude at this season of the year—the Japs withdrew to ridges west of Chichagof Harbor, while continuing to hold the pass between the two bays. The Japanese reported that they had taken 13 American prisoners.

More fighting developed on May 14th. Straight attacks against the ridge positions east from the beach-heads made but slow progress, notwithstanding the assistance of the artillery. The commanding general thereupon forbade further frontal assaults. As the fog cleared away later our Air Force bombed the enemy's positions, those on the north end around 1100 and those on the south end during the afternoon. The Navy helped by shelling the north positions. As a result of the combined shelling and bombing the enemy was nearly destroyed on the north side, and the American line was able to advance.

During the following two days attempts were made to drive the enemy further back. To avoid severe losses operations were limited to infiltrations and efforts to encircle enemy posts. The Air Force aided as much as possible, but constant fog prevented very much being accomplished from the air.

By May 17th the artillery had enough guns and ammunition on shore to give strong support to the infantry. On the Holtz Bay side attacks were made from the two beach-heads, which were still separated from each other. These succeeded in pinching the enemy out and uniting the two American detachments.

This success was exploited by a combined attack, during the night May 17-18, against the enemy holding the pass connecting Holtz Bay with Massacre Bay. This met strong resistance. It was necessary to wait until the fog lifted. The Navy then shelled the enemy in the pass, and the division field artillery were able to give better aid. With this help the attack gained such ground that by noon the Americans from opposite sides were in sight of each other. Soon after the pass was cleared. Some individual Japanese escaped to the high ground in the vicinity, and started a vigorous sniping fire.

On May 19th the Americans concentrated against these snipers, and suppressed them. Operations then turned against the enemy's main positions which covered Chichagof Harbor. During the night May 19-20 a limited attack captured a Jap advanced position. Then the enemy counterattacked. As this was unexpected it went through our lines into the rear areas. All American forces in the vicinity closed in on the Japs, however;

they were completely surrounded, attacked from all sides, and are reported as having been entirely destroyed.

On the 21st, the weather being fairly clear, the Air Forces strongly attacked the enemy's main positions. The village of Attu, less one house, was destroyed. Japanese reports state that on this day a submarine attack against American naval vessels off Attu resulted in damaging 4 warships. There are no American reports of this alleged event.

On May 22nd 15 Japanese bombers, believed to have come from the airdrome on Paramushiro Island, at the north end of the Kurile group, attacked American ships off Attu but failed to cause any damage.

Next day 16 Jap bombers appeared, this time to be engaged by 6 American fighters. Our accounts list 6 Japanese shot down, as against a loss of 2 American planes. The Japanese claim that on this occasion they sank an American destroyer and damaged 2 other ships, but American accounts are silent as to this.

In the meantime our ground troops were daily making limited attacks, gaining ground here and there, and by the 24th were closing in on Chichagof Harbor from the south. On the 25th the Navy shelled the harbor and vicinity.

On 26th May the line was approximately through Southwest Peak—Lake Cories (to enemy)—Lake Nicholas—Sarana Bay. The American infantry, supported by artillery fire, attacked the enemy south of Lake Cories and on Southwest Peak. Their attack was continued on the 27th, and the enemy cleared out of the area south of Lake Cories. Under good artillery protection, supplemented by infantry mortar fire, our troops advanced on both sides of Lake Cories.

The Japanese colonel in command of the enemy's forces on Attu, now felt that his position was hopeless. He decided to make one last attack, utilizing all available members of his command. Officers visited the hospital and killed all sick and wounded who were incapable of taking the field. The slightly sick and wounded joined the combat troops. All members of the navy, air corps, and services also joined. There were not enough hand weapons to equip all, so a part were outfitted with bayonets attached to long sticks.

At 0400, May 29, this force of all available Japs counterattacked from Southwest Peak, in a southerly direction. As in the previous counterattack, the Americans were surprised. This one went through our line, gained headway, and advanced more than a mile into the rear areas. Some of our soldiers were bayonetted or killed by hand grenades in their shelter tents before they knew there was any enemy in the vicinity. The Japs captured a battery and turned the guns on our troops. At a regimental CP the headquarters detachment managed to defend themselves, but the CP was isolated as the enemy went on around it.

In very confused fighting, the enemy's advance was not stopped until 1100, or seven hours after it had been launched. By this time it was close to the division CP. The enemy now stayed wherever they happened to be; Americans closed in on them, and savage fighting lasted all the remainder of the day. The regimental CP was rescued, but 4 of its officers had been killed by then. The majority of the Japanese appear to have been killed before the day ended, their dead being estimated at about 400.

The remainder of the Japs kept on fighting all of the night of May 29-30. At 0500, May 30, all the Japs that were left (about 50 men) gathered together and made a final attack against the same regimental CP which they had so nearly captured the day before. As there was no surprise this time, they were stopped almost at once by fire from all directions. The survivors withdrew into a gully. Each Jap then took a hand grenade, pulled the pin, and held it in his hand close to his heart until it exploded.

So ended the fighting on Attu Island. Except for isolated stragglers there were no Japs left. The Americans entered Chichagof Harbor, and the campaign was over. Up to this time only 4 Jap prisoners had been taken.

Our casualties for the entire campaign have been announced as 342 killed, 1,135 wounded, and 58 missing. The latter were presumably lost in the sea in the initial landing. The total is 1,535. 1,791 Japanese were found dead. Ultimately 12 stragglers were captured at large in the island, making a total of 16 prisoners in all. This leaves about 600 to 700 Japanese unaccounted for.

THE SOUTH PACIFIC

The commands of the Army (based on Australia, under Gen. MacArthur) and of the Navy (whose main operations originate from Guadalcanal) have been very active in the air. Only minor land or naval surface activities have occurred.

Two air battles have taken place, both over or near Guadalcanal and both due to attacks by enemy planes. The first battle occurred on May 13th, near the Russell Islands. About 25 enemy planes engaged an American force. Our reports indicate that 16 of the Japanese planes were shot down, against an American loss of 5 planes. The Japs admit the loss of but 2 planes. The mission which caused the Japanese to send this force toward Guadalcanal has not been ascertained.

The second air battle took place on June 16th. A Japanese force of about 120 planes (half bombers and half fighters) appeared at Guadalcanal to attack a convoy of ships at anchor under protection of a naval escort. A long, prolonged fight followed, the Japs being engaged by 30 Navy and Marine Corps planes, 36 Army planes, and 8 New Zealand planes—a total of 74. About 1415 the battle was started by Jap dive-bombers seeking to sink ships. The naval escort aided our planes by anti-aircraft gun fire, in which shore batteries joined.

The enemy was gradually split up and forced away, chased by Allied planes. A series of detached air engagements followed over a wide area. Enemy bombs succeeded in damaging 2 freight transports and a barge, causing a personnel loss (together with that from 6 Allied planes) of 25 killed, 29 wounded, and 22 missing—a total of 76. The enemy is reported to have lost 77 planes shot down by Allied air forces, plus 1 by the AA batteries and 16 by the naval escort, making a total of 94 planes or nearly 80% of those engaged. Japan admits the loss of 20 planes.

American planes have been vigorously scouting and bombing over Japanese bases in Timor, the Tanimbar and Kei Islands, the north coast of New Guinea, New Britain, New Ireland, and the north part of the Solomons. Occasional flights are made to Celebes, and one was made to Nauru Island. The general report is that the enemy is strengthening his air forces in this theater of operations.

Japanese air activities have been on a reduced scale. Regularly their planes fly over Guadalcanal and the south coast of New Guinea. Their strongest air forces have appeared in the Solomons. The enemy's main base in this area is at Rabaul,

New Britain, where there are several airfields and extensive establishments. Advance fields exist in the Solomons on Bougainville, New Georgia, and Santa Isabel Islands. Rabaul used to be the Australian administrative center of their Melanesian Islands. On account of excessive volcanic activity in the vicinity it was abandoned in favor of Salamaua, New Guinea, where a new capital was developed. This too is in enemy hands. As it is close to the front line, it is from a military point of view an advance post. The main Japanese center has accepted the risk of earthquakes and volcanic eruptions on New Britain Island.

BURMA-INDIA FRONTIER

Without enemy interference the British withdrew their line slightly near Maungdaw on May 12. The front line is now substantially along the boundary of India and Burma. Further north, British troops who under Brigadier O. C. Wingate had raided deep into central Burma, interrupting railroads and generally interfering with enemy circulation, withdrew back into India. This withdrawal was not without difficulties, and had some losses, but the majority of the expedition returned—some of them only after incredible hardship.

The rainy season is now on, and will continue until about November. While it is not impossible to conduct military expeditions during this period, there seems to be common consent not to do so. At least, not on the ground. Air activity is restricted by rain and low clouds, but continues nevertheless. Allied air activity is much greater than that of the enemy. British and American planes are attacking railroads and water transportation as primary targets. Lesser attention is given to industrial plants and enemy positions.

On June 18th the British Government announced that effective about September next, their forces fighting the Japanese in Burma would be organized into a new command to be designated as the East Asia Command. It is presumed that this is preliminary to more active operations against Burma, to commence after the close of the present rainy season.

The Japanese have noted this and other signs indicating an intent of the Allies to assume the offensive shortly, particularly the statement by Prime Minister Churchill in Washington on May 23d that Great Britain was anxious to intensify the war against Japan, especially from India. He stated that he believed sound and good conclusions toward this end had been reached in the conference in Washington, in which he was participating.

The Japanese are reinforcing their troops in Burma. A new railroad is under construction from the vicinity of Moulmein, eastward into Thailand, there to connect with the Thai RR. When it is completed, troops will be able to proceed via Bangkok into Burma by rail, as an optional route to the sea voyage through the Strait of Malacca.

CHINA

Several minor Japanese campaigns have been under way in various provinces. Some of them had the mission of overcoming Chinees troops, and others the seizure or destruction of supplies. About 50% of the Japanese force was reported as being Chinese troops of the Nanking Government under Japanese control. The proportion of these mercenary Chinese forces is increasing.

The major Japanese expedition was in the latter half of May, and consisted of an advance of a Japanese force, estimated by the Chinese Government as about 60,000 men, south from the Yangtse River in Hu-Peh Province into Hu-Nan Province. This force was all Japanese, and marched on a broad front.

Accounts of this expedition from Chinese and Japanese sources are contradictory. They agree only in that the Japanese advanced until they were on the line from Tung Ting Lake to the vicinity of Ichang; this would be a front of some 150 miles. The Japanese claim they encircled five divisions of the Chinese Tenth Army and practically annihilated them with little loss to themselves. They then state that having accomplished their mission, they returned to the Yangtse River. The Chinese agree about the Japanese withdrawal, but claim they had won a great victory and driven the enemy back with a loss of about 40,000 men. Latest Chinese reports increase the enemy's strength to an original 100,000, so that both sides now agree that some 60,000 Japs did get back.

In the latter part of the campaign, while the Japs were withdrawing, the American 14th Air Force repeatedly raided the Japanese lines and appear to have caused considerable damage with but little loss to themselves. This Air Force in its communiques has been silent about the great victory announced by the Chinese.

Comparing this Japanese expedition with previous years, it appears that the Japs have annually raided into Hu-Nan Province with the mission of capturing or destroying rice and other food products which otherwise might reach the Chungking Chinese. This year the expedition was further west than

usual, as the main body has heretofore been directed toward ChangSha. The reason for this change is unknown, but the Japanese mission was probably no different from what it has formerly been. We must wait for additional information to know whether the Japanese or the Chinese were the winners in this campaign.

COMMENTS

The Japanese radio has commented on the preparations of the Allies to attack Japan. It has announced that effective counter-preparations are under way. The new air bases in the south covering a possible Allied advance from Australia or the Solomon Islands, are reported as substantially completed. Our reports state that the Japanese air forces in this area are steadily increasing, notwithstanding that in combats with our planes the Japs are losing 3 to 6 times as many planes as we. If this is correct, it would indicate that the enemy is now able to produce a greater number of planes than before, and is more than replacing losses and wastage.

The enemy is still strengthening his position in Burma. Some increase of troops has occurred, but major attention seems to be directed to improving lines of communication so as to permit rapid concentration of troops in areas where Allied attacks may occur. The boundary between Burma and India is mostly savage mountain ranges, the mountains lying in north-south chains with deep valleys in between. These mountains being largely covered with jungle, it is difficult to deploy large forces against enemy positions.

To obviate this difficulty it may be simpler to invade Burma by sea, landing in the south part of that state or even in the Malay Peninsula. To prevent this possibility the enemy is constructing new routes of communication in a west-east direction in southern Burma.

Assuming that the statement made by the Japanese Premier on June 16th is correct—that in fact Japan's mission a year ago in occupying Attu and Kiska was to divert American forces to that distant area, and not an afterthought — it clears questions as to whether Japan had offensive or defensive intentions in advancing into the Aleutians. She may in fact have had neither. Japan has attracted substantial American forces (military, naval and air, and considerable shipping) to as far north in the Pacific as reasonably practicable, at slight cost to herself. Whether this materially affected our operations in the south Pacific (so as to give Japan more time to coasolidate, which presumably was what she wanted) is not yet known.

The Japanese High Command in Manila has issued a General Order appointing a Board of Filipinos to submit recommendations for an independent state, which it is stated will be inaugurated this year. A similar order is contemplated in Burma, but has not yet been issued. The Japanese refer to "progress" in their efforts to consolidate their position in China, but details are not yet available.

THE MEDITERRANEAN AREA (May 15 to June 20, 1943)

Operations of land forces ended with the fall of Tunisia, and none have since occurred. As soon as the Tunisian campaign ended, however, an intense air campaign was initiated against Italy and Italian islands. This had a threefold mission:

a. **Against the islands of Pantelleria, Lampedusa, Lampione, and Linosa, with a view of causing their fall;**
b. **Against the large islands of Sicily and Sardinia, to destroy their airfields and ports preparatory to invasion by land forces; and**
c. **Against Italy, to interrupt communications with Sardinia and Sicily and destroy plants and supplies working for the Axis.**

OPERATIONS AGAINST PANTELLERIA AND ADJACENT SMALL ISLANDS

A sea blockade was instituted immediately. These islands are generally short of water, and although some crops are produced they are insufficient for the inhabitants and the local garrison. They had been supplied principally by sea, but air communication was possible by land planes to Pantelleria and Lampedusa, and by sea planes to all of the islands. To the sea blockade was added an air blockade to prevent any supplies or replacements from reaching any of the islands.

Air attacks were at first concentrated against Pantelleria, as the most important of the small islands. This is an extinct volcano, on an island about 13 miles long and averaging 3 to 4 miles wide. All parts are visible from the air. There was a good air field. The only practicable sea-landing place was a small port at the northwest corner of the island.

The island was strongly bombed on May 18th and 20th, but beginning May 23rd it was bombed every day, repeatedly by day and night, with constantly increasing bombers and weights of bombs. This bombing was not evenly distributed, nor were bombs dropped at random — a prepared program was followed. The first bombings were directed against AA batteries, with the mission of facilitating future bombings by removing the most dangerous opposition. These were followed by attacks against the coastal batteries, to enable the Navy to come in close to shore to shell the port. Next the port itself was bombed, to make a landing possible.

By June 1st the Italian communiques admitted that heavy damage had occurred at Pantelleria. On the 3rd and 5th British naval forces (cruisers and destroyers) shelled the port of Pantelleria. On both occasions the enemy's batteries replied, although without causing any damage. On the 6th the Air Force, flying in relays, made the bombings practically continuous. They were suspended at noon, June 8, when a letter was dropped on Pantelleria suggesting surrender. It was pointed out that the island was completely cut off from all hope of assistance, and that the Allies were prepared to bomb the island without intermission until it did surrender. No reply having been received by 1800 the bombings were renewed on an uninterrupted program.

On June 10th the severity of the bombings was increased still further. On the 11th the Italian commander surrendered by displaying at 1100 a white cross on the air field where it could be seen from the air, and a white flag at the entrance of the port where this could be seen by naval vessels. Soon after, British forces were landed at the port of Pantelleria, and the island occupied. The Italians claimed that the surrender was caused by a shortage of water.

Lampedusa was now bombed intensively, and it surrendered in turn on June 12th. On the 14th the islands of Linosa and Lampione were found to be uninhabited.

Axis planes did not interfere with the air attack on Pantelleria. They were kept off by Allied fighter planes. But Axis planes did attack the British forces occupying Pantelleria, and in the days following its fall claim to have sunk at least one transport and a dozen or more landing barges, besides damaging a half dozen other transports and numerous small craft.

AIR ATTACK AGAINST SICILY AND SARDINIA

In the period May 15 to June 9, inclusive, the Air Force attacked objectives on Sardinia on 14 days and on Sicily on 12 days. Special attention was given to air fields, railroads, and bridges. Ports had previously been attacked, so less bombing of these took place. Numerous air fights occurred in which (according to Allied accounts) the enemy lost 2 to 3 planes to our 1 or, according to the Axis, about the reverse.

The ferry transfer between Sicily and the mainland near Messina was repeatedly attacked. From the reports it would seem impossible for it to still be operating.

In Sardinia the bombing of Cagliari at the south end of the island, which has important air and naval facilities in the vicinity, has resulted in an evacuaton of the population. Some changes of population have been made in Sicily, but the real effects of the bombings is not yet known.

AIR ATTACK AGAINST ITALY

There has been one large attack each against Livorno (Leghorn), Grosseto (an airfield not far from Rome), Naples, and Taranto (which is the main Italian naval base and an important air center). Information indicates that these raids have dislocated Italian centers of population, but how much this has interfered with Italian economic life is uncertain.

EAST MEDITERRANEAN AREA

British air forces regularly raid over the Aegean Sea and along the west coast of Greece. This is primarily for information purposes. The only traffic noted has been small sailing craft, which are attacked and in some cases sunk. Enemy planes similarly patrol as far eastward as Cyprus and the Levant. These are minor operations.

The main interest in the east Mediterranean is the attitude of Turkey. If Turkey would join the Allies, with its army (largely reequipped with lend-lease materiel) it could play an effective part in establishing a second front in the Balkans. The Turks already have a bridge-head in the Balkans, in the area Edirne (Adrianople)—Istanbul. Without the aid of Turkey it will be hard for the Allies to invade the Aegean Sea area.

According to Turk reports strong British forces are at the Turkish border with Syria and Iraq, presumably to advance rapidly to Turkish assistance beyond Istanbul as soon as Turkey gives the word.

COMMENTS

Strong psychological efforts have been made to induce Italy to abandon the Axis and join (or surrender to) the Allies. Prime Minister Churchill, in his Washington speech in May, expressed the opinion that the Italians would be well advised to rid themselves of their wicked leaders and throw themselves on the mercy of the Allies. This month President Roosevelt has suggested that the Italians had better surrender quickly. The Allied radio in north Africa is day and night asking the Italians to surrender, and asking the Germans to quit Italy. It is represented that for the Germans the abandonment of a weak ally would really be to their benefit, and that their best move would be to evacuate all territory south of the Alps. For the Italians it is represented that a riddance of the hated Germans, and their substitution by British and Americans, should be a real blessing.

So far this psychological effort has not achieved its aim. It was really started in December, 1940 by Mr. Churchill, who then broadcast an appeal to the Italians to quit the leadership of Mussolini as the source—and the only source—of all their troubles. After 2½ years without success, the campaign is being intensified. The Allied radio is now announcing that in view of the lack of response by the Italians, Allied air forces will bomb Italian industries more intensively than ever until they leave the service of the Axis.

Effects of the war on the Italian people are not exactly known. Numerous reports are in circulation alleging that the Italians are unhappy and want to surrender. It seems clear that all of the Axis states do desire peace, but not on an unconditional surrender basis. Italy is taking steps to meet the situation of a prospective invasion.

Certain evacuations of civilians from Sicily, Sardinia, and south Italy are in progress. In south Italy the movement, which has been going on for some weeks in an orderly manner, was scheduled to be completed on June 22nd. Some other movement, the nature of which is not yet known, is then to start on the mainland. The industrial area of Italy is mostly in the north, and to date hasn't suffered materially. South Italians are an agricultural people who live in towns rather than on farms. There is no particular reason why they shouldn't live on the land, and it would seem quite possible to reorganize the people on this basis. Living in towns is a relic of the medieval ages when it was unsafe for individual families to live alone. This custom has simply been continued.

So far no important opposition to the leadership of Mussolini in Italy has appeared. There are differences of opinion as to particular lines of action, but in general the people believe that their leaders are doing the best possible for them. No one appears anxious to assume Mussolini's duties.

This state of mind of the Italians is about the same as that in all the great powers on both sides of the war. Hitler, Stalin, Churchill, and Roosevelt have no serious political opposition. All of the nations believe their particular leaders are working for their interests, and that a change during a great war is inadvisable. The same situation exists in Italy.

THE WAR IN RUSSIA (May 14 to June 21, 1943)

On May 14th a dispatch from Moscow stated, "A German attack with tightly concentrated fist of armor is expected." No such attack has occurred, although it has been repeatedly predicted as just about to begin. The only German attack was made on May 30th, and was a strictly local affair with the mission of straightening a kink in the line in the vicinity of Velizh, on the upper Dvina River. According to German accounts the operation gained its objectives within a few hours, and thereafter held them; according to Russian accounts, the Germans after making some slight initial gains were driven back within the next two days to whence they had started.

On their part the Russians have been conducting a strong offensive, off and on for many weeks, against the Axis bridgehead around Novorossisk, a good Black Sea port and formerly a Russian naval base. This Russian operation commenced about April 1st and has since been going almost constantly. The Russians have attacked sometimes along the north front, and sometimes along the east front—occasionally they have attacked both faces of the Axis position simultaneously. This bridgehead is about 45 miles long and from 20 to 30 miles deep. Only on the north and east is the position assailable by ground troops.

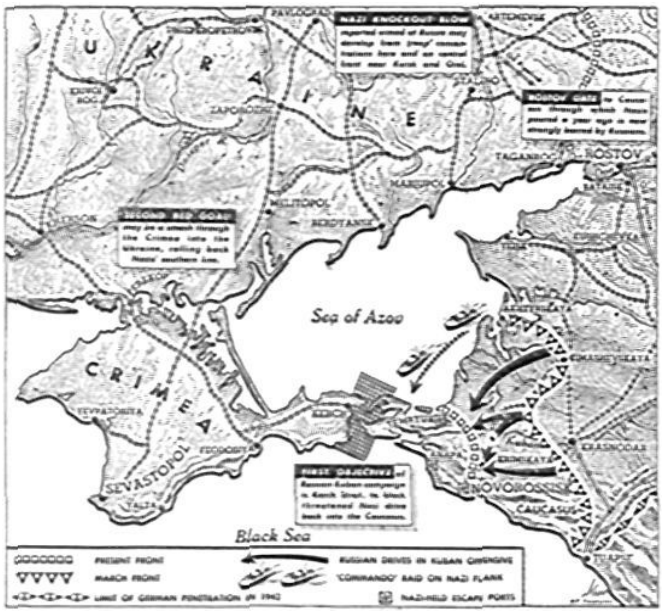
After an interval of 16 days a new Russian attack was launched on May 26th. Before daylight the Russian artillery fired a two-hour preparation on the sector, which includes the town of Krimskaya. This fire was so strong that the Germans evacuated that town and some other front positions. It is possible, but not certain, that the Germans had planned to abandon certain forward positions temporarily. They had foreseen the attack, for the Russians were using fresh troops who had arrived by rail in the area Slavyansk—Krasnodar. The Axis air force had observed this movement, and it rightly concluded that a new attack was coming.

Due to the success of the artillery preparation the Russian attack made initial progress. Three armored divisions led the advance, and 6 infantry divisions followed. The left of the attack seems to have been about through Krimskaya. A strong air force aided, but the Russians immediately met powerful forces of German and Romanian planes. Russian planes concentrated on attacking ground targets, using machine guns

and cannon—not much bombing. Axis ground troops, partly German and partly Romanian, were disposed for defense in an irregular checkerboard pattern of small anti-tank posts.

The Russian armor penetrated the Axis line to a depth in places of 1½ miles, but they were considerably broken up when they had gone this distance. Germany reports that the antitank posts destroyed 48 enemy tanks and the air forces an additional 13. Most of these were medium tanks, but a few 52-ton machines were put out of action. In view of this situation the Russian armor withdrew, and the infantry divisions took up the attack.

By this time the Axis counterattack, which had been held back



outside of the area expected to be covered by the Russian artillery preparation, also commenced to come into action. A meeting engagement took place, with the Axis having the advantage—the terrain contained numerous Axis fortified centers of resistance, with excellent fields of fire. Many of these were now in rear or on the flanks of Russian forces, and were a source of serious embarrassment. The Russian line commenced to go back. As the Axis artillery knew where their centers of resistance were, these did not interfere with the Axis fire.

The Axis air force (which had been making its main effort against the Russian armor and infantry) finding the armor withdrawn and the infantry withdrawing, in the afternoon shifted the weight of its attack against the Russian artillery. Several hundred German dive-bombers savagely attacked the batteries. German battle planes (equivalent to our fighters), protected the dive-bombers. At this time only 200 Russian planes are reported as being in the air; they were hopelessly outnumbered. A new Russian division appears to have been ordered forward from army reserve, but reports fail to indicate that it arrived on the field during the day.

By night the Axis had not recovered all the positions lost, but they had regained some of them. They had also succeeded in isolating the Russians in the forward areas from their line of departure. This battle continued with considerable ferocity on the following day. It ended with the line practically unchanged.

In this hard-fought battle the Russians appear to have been much below the proper strength. The three tank divisions are reported as having had but 170 tanks present in line altogether; the shortage of planes has already been noted. Only the artillery seems to have been in great strength. Assuming the German report as to having disabled 61 enemy tanks is correct, there was a 36% loss. It is probable that many more tanks must have been partially damaged. This would explain why the Russian armor retired comparatively early in the fight.

After this battle the Russians brought in 3 more armored and 3 more infantry divisions. On various occasions these fresh forces attacked, sometimes on the east and sometimes on the north front. No appreciable gains have been made. The Germans report the loss of an additional 39 enemy tanks. This is a rather small number, indicating that the new divisions were apparently also below the prescribed strengths.

On June 8th and 9th the Russians sought to attack the west flank of the Kuban bridge-head by an amphibious expedition on the shores of the Sea of Azov. This had no success at all. German reports claim that 63 landing barges were sunk by the air force. Among the latter was a Spanish unit. This is the first identification of Spanish air forces in Russia, though a Spanish division has been in line for a long time; it was last reported as south of Leningrad.

The Axis has been conducting a vigorous campaign against guerrillas in the rear areas. To include June 9th, 325 separate bands and camps are reported as captured or destroyed. Operations appear to have been limited to the central sector, which is largely covered with forests and swamps, affording good hiding for small bands. The Russian army has been supplying the guerrillas with arms, ammunition, and replacements by dropping them from the air, and directing operations by radio. In return the guerrillas have been sending identifications and other information to Russian CPs. Their operations (according to Russian reports) are mainly the wrecking of railroad trains, and to a lesser extent interfering with road circulation.

Assuming the Axis report as to the conclusion of the guerrilla campaign is correct, there seems to be nothing to prevent the Russians from dropping more guerrillas in rear of the enemy lines, to replace those captured or killed in action. Any relief the Axis may have obtained by suppression of 325 bands is probably only temporary.

The Axis Air Force has departed from its previous policy of limiting air operations to the tactical assistance of ground troops. A very extensive program has been directed toward bombing railroads and locomotives in Russian back areas. This is copying the British policy (inaugurated last year in west Europe) of constantly raiding lines of communication, especially railroads. The Axis is also bombing Russian industrial plants, large raids having been directed against Gorki and Yaroslav, both places with important establishments. Commencing in June other raids have been made against the Volga estuary on the Caspian Sea, a number of ships having been reported sunk and others damaged. These ships are engaged in transferring lend-lease supplies from Iran (Persia) by water to the Volga River, for transhipment to the heart of Russia. They also bring oil from Caucasia. How much actual damage these raids have caused is unknown.

Both sides in Russia are actively raiding each others lines. Identifications, the main mission, are not always secured. Still,

enough are obtained to give a fair estimate as to the strength and general dispositions of the opponent. Consequently the Russian estimate that the Axis strength in Russia totals 218 divisions, is probably approximately correct; this would represent about 4,500,000 men, including services.

Reports from Moscow claim that the air strength of the Axis in Russia is about equal to that of the Russians, with each side having occasional air superiority in selected sectors. The Russian Air Force is raiding railroad junctions in Axis rear areas. This has been done mostly at night, and the results are unknown.

COMMENTS

There is some indication that Russia is having difficulty in providing personnel for its units. Travelers generally comment on the number of women employed with the Army. Russian communiques have mentioned women air pilots and their accomplishments, and women snipers have been reported on duty for some time.

At the beginning of the war the population of Russia was figured as over 180,000,000. Out of this Stalin, in his communique of June 21st, states that 4,200,000 had been killed to date in the war. The territories occupied by the enemy had a population of roughly 50,000,000. The exact number passing to enemy control can not be determined, for many men were in the military service and so were not taken by the enemy, although their families were. Large numbers of other men went with the retreating Russian armies for work in industrial plants, on the railroads, and in other essential work. Consequently only an estimate can be made of how many Russians are now inside hostile lines. In a general way the population of Russia under control of its government is around 125,000,000, or not much under that of the United States.

It would seem, therefore, that Russia should be able to raise military forces approximately equal to those raised by this country. If the enemy only has 4,500,000 men in Russia, as stated by the Russian Intelligence service, it appears that Russian man-power is available for a much superior force. The United States is raising military forces of over 10,000,000, out of which about 20% are assigned to the Navy. Russia has a very small navy, so nearly all its personnel is available for ground and air forces. It would seem possible to organize armies double the strength of what the enemy has.

There are various explanations as to why this isn't so. A large Russian army is on the Manchurian border; this is estimated at 600,000 men. Other forces are on the border of Turkey, in Iran, etc.; the strength of this force is unknown, but it may be that a million Russian troops are on detached service of some kind.

The Russian report that their air force is only equal to that of the enemy may be due to difficulty of supplying more planes, gasoline, and other supplies, rather than trouble in furnishing personnel. The same may also apply to the ground troops. At the Food Conference held at Hot Springs, Virginia, in May, the Russian representative commented on the shortage of food in Russia and made it clear that more food was needed immediately.

The reason why Russia has found it impracticable (notwithstanding superior numbers) to undertake a major offensive against the Axis, may well be difficulty in supplying its military forces with arms and equipment, and its entire population with food. Loss of the Ukraine, which is almost entirely in enemy hands, resulted in the loss of the largest food area in Russia, estimated as having produced 60% of the food. Of the remainder of the territory, a large part of Caucasia was ravaged by the enemy last autumn. The enemy secured or destroyed a large part of the harvest, and before evacuating the territory be destroyed or removed the farm tools and machinery and many of the farm animals. Allowing for the fact that only 70% of the original Russian population remains to be fed, it is easily seen that the food situation is not good and may materially affect the military situation. Of course new areas are reported coming into production in Siberia, but here there is the difficulty of transporting freight to Russia.

The situation regarding food is duplicated as to mineral products. The Ukraine was the chief Russian center of production for steel, iron, and other heavy industries. Even with the help of lend-lease supplies, now moving to Russia in great volume, the equipping of the Russian armies is a tremendously difficult task. The Axis is now interfering with Russian supplies by its new intensified air attacks against plants and against lines of communication. It may limit its offensive to such air raids, for some time.

WESTERN EUROPE (May 13 to June 20, 1943)

Activities in west Europe have been mainly limited to air raids. Those by the Allies have been on the largest scale ever made; those by Germany have been on a small scale, without important results. Results of the Allied raids can only be guessed at, for there is no reliable information except air photographs taken afterwards These show great destruction of buildings, but whether the buildings were occupied, and if so by what or by whom, can not be determined. It seems, however, reasonably certain that material damage has been caused to the Axis industrial system.

British air attacks against railroads (particularly in north France) have continued, but on a reduced scale. Attacks are regularly made on Axis shipping. In spite of all that has been done, a sizable maritime coastal traffic plies between Axis ports on the North Sea and along the Channel. Axis ships keep close to shore, have protection of coast batteries and numerous motor patrol boats, and always have an escort. A similar traffic exists between British ports.

The following is a list of the more important places bombed, with the number of Allied planes lost indicated in ( ). In general, bombings by day have been by American forces, and those by night by British (including Dominion) forces.

Date	*Night**	*Day*
May 13	Duisburg, by a heavy force (43)	
14	Ruhr, in very great strength (34)	Antwerp (12). Over 2,000 casualties reported in this raid.
15		Emden (6). Germans claim this raid was intercepted and but few planes got through.
17	Two dams in the Ruhr (10). Heavy losses from escaping waters has been admitted.	Bordeaux. Heavy personnel losses admitted (14).
19		Ship yards at Kiel and Flensburg (6)
21		Wilhelmshaven and Emden (15)
24	Dortmund, in very great strength (38)	
26	Dusseldorf, very great strength (29)	
28	Ruhr, in very great strength (27)	
June 11		Ship yards at Wilhelmshaven and Cuxhaven, by over 200 bombers at very high altitudes (8).
12	Dusseldorf, in very great strength, over 2,000 tons of bombs being dropped (53)	
13	Bochum (24)	Kiel and Bremen (28)
15	Oberhausen (18)	
17	Cologne (17)	
20	Le Creusot, France (3)	

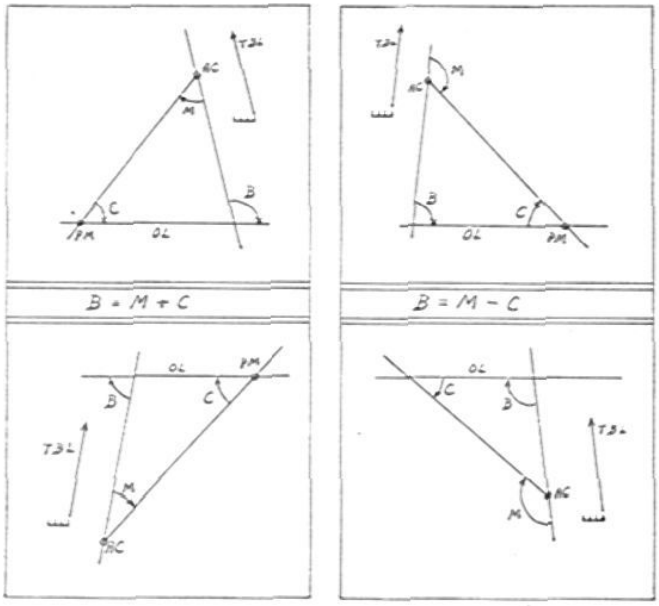
*Preceding date shown.

Base Angle Laying and Measurement: One Method

By Col. Malin Craig, Jr., FA

During one period in the training of a battalion, considerable delay was experienced in reporting the measured base angle. Investigation revealed that the executives were grabbing an aiming circle and racing away to the nearest point on the orienting line, often well out of voice range, to lay therefrom with all the attendant relay, signalling, loud shouting, and general confusion—not to mention the time lost in covering the distance and returning. On one occasion an executive had to traverse a deep gulch in which he was lost for days.

The first solution to present itself was to establish battery orienting lines, parallel to the battalion orienting line, and closer to each battery. There are two drawbacks to this method. In the first place, it is not always possible to locate a line parallel to another and in the vicinity of the battery, without considerable relocation of the vegetation and even of the terrain features nearby. Secondly, inexperienced executives have a way of making mistakes in laying out such auxiliary orienting lines, and the resulting angles are erroneous with distressing regularity.



The system here outlined gave good results, after the initial repugnance of the executives to any new way of doing things had been overcome. It is important that the executive make a rough sketch at first, in order to avoid confusion of angles involved.

EXPLANATION

B—Base angle (from base line clockwise to orienting line).
C—Constant angle (interior angle of triangle ABC at place mark).
M—Measured angle (clockwise angle from base line to place mark).
OL—Orienting Line.
PM—Place Mark.
AC—Aiming Circle location near battery position.
TBL—True Base Line (the "base line" referred to above is in reality the line parallel to the true base line and passing through point AC).

PROCEDURE

Preliminary

Measure and record angle C.

To Measure Base Angle

1. Lay zero of aiming circle parallel to base line reciprocally.
2. Measure angle to place mark (Angle M).
3. Derive angle B:
   If angle M is an interior angle of triangle ABC, B = M + C.
   If angle M is an exterior angle of triangle ABC, B = M — C.

To Lay Battery with a Base Angle

1. Compute angle M and set it on aiming circle with upper motion.
   If angle M is an interior angle of triangle ABC, M = B — C.
   If angle M is an exterior angle of triangle ABC, M = B ÷ C.
2. Lay aiming circle on place mark with lower motion (zero of instrument is now parallel to true base line).
3. Lay guns parallel to aiming circle reciprocally.

ARMY WIVES

The Locators, P.O. Box 537, Fort Leavenworth, Kansas, provide a unique and useful service by maintaining a file of the addresses of officers' wives. No lists are furnished, but anyone legitimately desiring a particular address can obtain it without charge by merely making inquiry accompanied by stamps for reply. When inquiring, be sure to give all possible information (such as husband's name, grade, branch, etc.) to facilitate identification of the proper individual.

Some of your friends may even now be seeking you. How about sending The Locators the necessary data, so your name can be added to the 25,000-plus now on file? Just give your husband's name, rank, and branch; your own given name, nickname (if any), and address, indicating whether the address is just temporary or for the duration. And help keep the files up-to-date by advising of any move of your own, or sending authentic information (not rumors) of the whereabouts of other army wives.

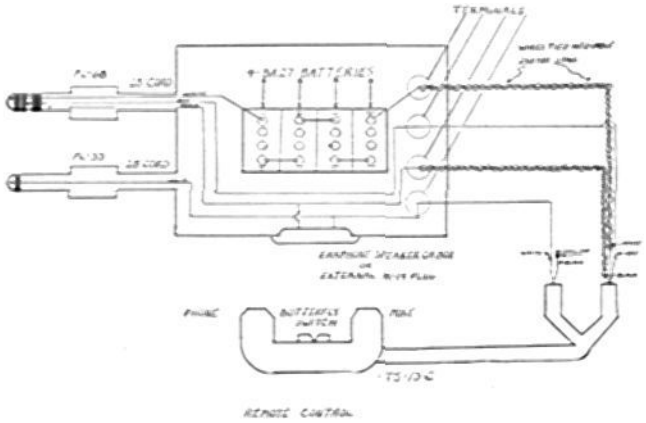
Not in the BOOK

EDITOR'S NOTE: *This feature is devoted to ideas sent in by our readers describing methods or devices which, though not specified by official literature, have proved useful in service.*

REMOTE CONTROL, REVISED

When our new type radio was sent into the field it was equipped with a remote control unit (RM-29), the purpose of which was to remove the set from the vicinity of such strategic installations as FDCs, CPs, OPs, and concentrations of personnel by a distance of at least 150 yards.

Highly trained personnel find this remote control unit comparatively easy to operate, but since many authorized users of the remote phone are unfamiliar with the procedure it was found to be too tedious and slow for rapid and efficient communication. Therefore S/Sgt. J. R. Emerson and T/4 R. S. Stoner of our radio section built a simplified remote control according to the following specifications and diagram.



The box is constructed of common pine (2″ × 4″ frame with 1″ top and bottom) and is large enough to accommodate 4 BA-27 batteries such as are used in the RM-29. These batteries are connected in series in the microphone switch circuit. A TS-13 handset is used, since this has both the microphone and headset circuits in it. The plugs are removed from both the handset and the headset circuits; the handset tips are soldered to one end of the 150-yard cable, which in turn is connected to the remote control box by external connections. Both plugs are then connected to the wires coming from the remote control box and plugged into the set in their respective positions.

By use of the common ground wire one wire in the cable is eliminated, thus making use of only 4 connections instead of 5 as in the original handset and RM-29. This is made possible by the internal ground connection inside the chassis of the set.

Three pairs of W-130 infantry wire are used, 2 pairs of which are used as single conductors and the other as a talking-and-listening circuit. It is important to note that the negative side of the batteries is connected directly to the filaments; this is done to maintain proper filament voltage.

When operator or observer leaves his car to go to an OP all he has to carry is the handset, since the radio, remote control, and reel units are all left in the car. The headphone in the side of the box enables the driver of the vehicle to change channels if necessary and to reel in the wire when the observer's mission has been accomplished, since he can hear everything that passes through the set.

This remote control unit will operate equally well with 2 of our now-common radios, and has proven so efficient and fool-proof that it has been unanimously adopted by our organization.

CAPT. EDMOND C. GOUAZE, FA

FIRING TABLES UNDER YOUR HAT

In the June, 1943, FIELD ARTILLERY JOURNAL, Captain Alfred W. DeQuoy outlined a brief table which would permit speedy fire with the 105-mm howitzer even though no firing tables were at hand. His system requires a minimum of scratch paper and figuring. The system we have been using requires a bit more pencil work, but our formulae are simpler to memorize.

We worked on the premise that there would generally be no serious error if charges 3 or 5 were used instead of charge 4, or if charges 5 or 7 replaced charge 6. Charges 3, 5, and 7 have overlapping range limits and permit fire throughout the capabilities of the 105. On the basis of firing only at ranges between ½ and ¾ the maximum range of any given charge, charge 3 should be used against targets from 2,000 to 4,000 yards away, charge 5 at ranges from 4,000 to 6,000 yards, and charge 7 from 6,000 to 8,000 yards and on up to 11,000 yards. In short, the midranges are: for charge 3, 3,000 yards; for charge 5, 5,000 yards; and for charge 7, 7,000 yards.

As is indicated by the accompanying Table A, the following formulae give elevations for the above charges within the indicated limits, which are within 10 mils of the figures contained in FT 105-H-3.

	Elevation	*c*
Charge 3	9R (R+7)	11
Charge 5	3R (R+14)	7
Charge 7	3R (R+5)	5

		ELEVATION		VARIATION		*c*	
Charge	*Range*	*Firing Tables*	*Computed*	*Mils*	*Yards*	*Firing Tables*	*Computed*
	2,000	172.2	162.0	9.8	98	9.8	11
	2,500	222.6	213.7	6.9	69	10.4	11
3	3,000	276.4	270.0	6.4	58	11.2	11
	3,500	335.4	330.8	4.6	37	12.4	11
	4,000	402.8	396.0	6.8	48	14.6	11
	4,000	220.0	216.0	4.0	60	6.6	7
	4,500	253.6	249.8	3.8	53	7.0	7
5	5,000	289.4	285.0	4.4	57	7.4	7
	5,500	327.8	321.8	6.0	72	8.0	7
	6,000	369.6	360.0	9.6	106	8.8	7
	6,000	202.6	198.0	4.6	97	4.8	5
	6,500	227.2	224.3	2.9	58	5.0	5
	7,000	253.0	252.0	1.0	19	5.2	5
7	7,500	280.0	281.2	1.2	22	5.6	5
	8,000	308.4	312.0	3.6	61	5.8	5
	9,000	370.6	378.0	7.4	111	6.6	5
	10,000	443.0	450.0	7.0	91	8.0	5
	11,000	532.6	528.0	4.6	46	10.4	5

Table A

These formulae are readily memorized, or if one prefers they can be written on a slip of paper and pasted inside the helmet liner. This little chart gives a brief but highly accurate firing table for emergency use.

c can be either the approximate one listed above or you can calculate your own. This figuring is easily done: just compute the elevations for 2 ranges 1,000 yards apart, divide their difference by 10, and you have an average *c* for your sector. For example:

CHARGE 5

El. at 4000 = 12 (4+14) = 216
El. at 5000 = 15 (5+14) = 285
Difference = 69
c = difference ÷ 10 = 6.7 or 7

CAPT. HAROLD S. DAVIS, FA

MORE EFFICIENCY FOR THE FORWARD OBSERVER

During maneuvers and problems in a land of mountains and jungles we have sometimes found that our technique in controlling fires by forward OPs must be modified. At times our forward OPs have been practically helpless due to lack of information on their maps. Overlays arrive too late or the problem moves away from the marked sector. If the battalion displaces, the FO may lose all sense of the G-T line. Inexperienced officers send inaccurate data and use too much ammunition getting fire for effect on the target.

Although not the general or accepted practice here, some of us solve these problems by modifying the procedure followed by the FO.

When the FO joins his element of the combat team, it is impossible for him to have the battalion concentrations marked on his map; neither is it expected of him that he return to his organization until the action is over. He is, however, equipped with maps of the area or sector in which he might operate. On these maps have been plotted, at random, concentrations which are prominent, identifiable map points which are 3,000 yards or less apart; these may be mountain peaks, prominent hills, crossroads, bridges, etc. This work is done on all battalion maps prior to any activity on the part of the combat team.

On making contact with the enemy, and having selected his OP, the FO sends back his location to the FDC. He does this by taking an azimuth reading to the nearest marked concentration and estimating or scaling the range to the concentration. To this he may add some identifying phrase. Thus his message may be in this manner: "Reference Point Concentration No. _____, Azimuth _____, Range _____ yds, my location in saddle."

FDC plots the position of the FO on the firing chart (or map) in proper relationship to the designated reference point.

FO designates targets by a deflection shift from the reference point and a range from his OP. He does this by shooting an azimuth to the target and estimating or scaling a range from the OP. Thus a target designation may come back as follows: "Right 630, 1100, enemy mortars in ravine, will adjust." The amount of shift is the difference in azimuths to reference point and to target.

FDC acts on this sensing in the following manner. Using a 1:40,000 range-deflection fan, HCO plots the target in relation to the plotted position of the FO. All subsequent procedure is by normal air-ground sensing, acted on in the normal manner by the FDC.

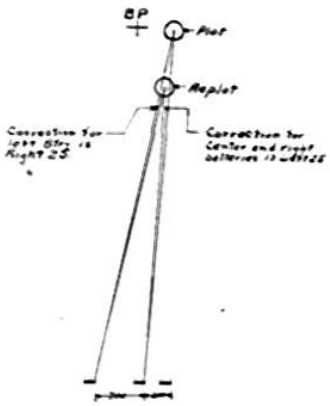
During lulls in the action FDC helps the FO to build up his map by sending by radio designations of plotted concentrations, in relation to the reference point. An example would be: "Left 400, 1200 yds., plot concentration No. _____."

By using the above method, delay may be avoided in sending forward overlays and the man or vehicle thus employed can be used in some better or more important mission.

The only extra equipment necessary is the 1:40,000 rn-def fan for HCO to use in making a rapid plot. Ranges are doubled on the fan when using a 1:20,000 grid sheet or map.

CAPT. HOWARD K. CLARK, FA

USE CORRECT CORRECTIONS!



In laying down a battalion concentration after one battery adjusts be especially careful if the range is short and the batteries widely separated. Here is what happened to us: the center battery and the right battery were about 200 yards apart, and the left battery was some 700 yards left of the center battery; the center battery adjusted, and the corrections for the center battery were properly sent to the other two batteries, and all fired for effect. To our dismay, the left battery's fire fell about 200 yards left of the target. The replot showed that due to the displacement of the left battery, the short range, and the direction of the range correction (which was minus), the deflection correction for the left battery should have been almost equal, but in the opposite direction (see figure). Under such circumstances, the proper procedure would seem to be to make the replot, and then measure the correction for each battery.

CAPT. T. L. LIPSCOMB, FA

GRAPHICAL FIRING TABLE FOR THE FA TRAINER

The trainer battery, long recognized as an essential in the training of artillerymen in axial and lateral conduct of fire, should serve just as well for fire based on accurate data. Surveyed firing charts may be prepared simply enough for the "range"—orienting line, base point, reference points, lateral OPs, etc., may all be located accurately by single-leg traverses.

FDC functions normally. Preparation of a graphical firing table not only facilitates the firing of the problems, but also provides a means for acquainting the men with such devices. Construction of the table is not difficult. Scotch tape may be used to hold a strip of bond paper to the sliding portion of the standard graphical firing table, and the elevations (in 5 ⅏ bounds) plotted on the strip opposite their corresponding ranges.

There follows a table of ranges corresponding to elevations in 5⅏ intervals for the M-2 (.22 blank cartridge) and M-3 (compressed air) trainers, as computed from Firing Table 1-A-1 (Ordnance Dept., Aug. 1, 1933) and Training Circular 29 (War Department, March 6, 1943).

CADETS ROBERT J. HEIL AND
THOMAS J. ANTHONY, FA-ROTC

Elevation	Corresponding Range		Elevation	Corresponding Range	
	M-2 .22-blank	M-3 Compressed Air		M-2 .22-blank	M-3 Compressed Air
95	2019		300	5161	3425
100	2115		305	5222	3488
105	2211		310	5283	3550
110	2304		315	5344	3612
115	2393		320	5405	3675
120	2482		325	5464	3738
125	2571		330	5524	3800
130	2661		335	5583	3862
135	2750		340	5642	3925
140	2839		345	5700	3988
145	2929		350	5758	4050
150	3017		355	5816	4112
155	3103		360	5874	4175
160	3187		365	5932	4238
165	3270		370	5989	4300
170	3353		375	6045	4362
175	3435		380	6102	4425
180	3516		385	6158	4488
185	3594		390	6213	4550
190	3670		395	6269	4612
195	3475		400	6324	4675
200	3821	2000	405	6380	4738
205	3897	2072	410	6435	4800
210	3971	2146	415	6489	4862
215	4043	2214	420	6543	4925
220	4114	2286	425	6596	4988
225	4183	2357	430	6649	5050
230	4253	2429	435	6702	5112
235	4322	2500	440	6754	5175
240	4392	2572	445	6806	5238
245	4460	2646	450	6857	
250	4526	2714	455	6908	
255	4592	2786	460	6959	
260	4656	2857	465	7010	
265	4721	2929	470	7060	
270	4785	3000	475	7110	
275	4849	3072	480	7160	
280	4912	3146	485	7210	
285	4975	3214	490	7259	
290	5037	3286	495	7308	
295	5100	3357	500	7356	

Diary of War Events

(As Reported in the American Press)

JUNE, 1943

1st
Gen. de Gaulle takes over the governorship of Algeria.
R.A.F. destroys 5 supply ships, scores 5:1 victory over Axis planes.
Russian troops repulse German attacks in the Kuban.

2nd
Allied air might concentrates on Pantelleria, Sardinia, and Sicily.
U.S. troops in Attu reported to have killed 1,500 Japs, captured only 4.

3rd
French leaders in Algiers form provisional government called French Committee of National Liberation.
Red Army begins strong offensive on the Tamar Peninsula (Caucasus).
All resistance ends on Attu.

4th
Argentine military revolutionary committee overthrows Castillo's regime.
Allied planes continue raids on Pantelleria and Naples.

5th
Gen. Marshall accompanies Prime Minister Churchill on Tunisian visit.
Allied aircraft continue to pound Italy.
Castillo resigns as Argentina's president after the one-day revolt.

6th
Allied bombers continue attacks on Italian mainland.
British submarines range as far north as Monte Carlo to sink 6 ships.
U.S. bombers raid Jap base at Kiska 5 times.
In the Solomons, Allied fliers bomb Kahili and sink Jap destroyer.

8th
Roosevelt promises full and swift retaliation if the Axis uses poison gas.
Allied planes continue to bomb Pantelleria and other Italian targets.

9th
United Nations drop leaflets on Pantelleria asking unconditional surrender, to save populace from unnecessary suffering. Demand ignored, bombing continues.
Air war reaches critical stage in Russia.

10th
Heavy air activity continues over Pantelleria and Sicilian targets.
Russian forces cross Mius River west of Rostov.

11th
Pantelleria surrenders after history's most savage aerial blitz.
U.S. air forces bomb Wilhelmshaven and Cuxhaven.
Heavy aerial activity continues in Russia.

12th
Island of Lampedusa surrenders; 10,000 Italian prisoners taken on Pantelleria.
Allied bombers drop 2,000 tons of bombs on Duesseldorf.
Chinese troops push Japs out of recently-won territory along Yangtze River.

13th
Navy reports U.S. subs sink 12 enemy ships, damage 3 others.
Allies occupy Lampione, tiny Italian island.
Russians attack Germans in 3 areas along 1,000-mile front.

14th
U.S. air force fights greatest air battle of the war over German naval and U-boat bases of Kiel and Bremen; we lose 26 bombers.
Island of Linosa surrenders to Allies.
Army, Navy, and Marines beat down Jap attack near Russell Islands, shoot down 23 Jap planes.

15th
Britain closes Syria-Turkey border.
R.A.F. raids steel and communications of Oberhausen.
8th U.S. Air Force in 18 daylight raids scored 6:1 victory over German planes: 105 to 571.

16th
Allied fliers continue to bomb Sicily and points on "toe" of Italy.
King George visits troops in Tunisia.

17th
U.S. fliers shoot down 77 Jap planes over Guadalcanal, lose only 6.
Bad weather hinders air activity in North Africa.
Allied fliers make heavy raid on Cologne; lose 14 bombers.

18th
U.S. bombers continue to pound Sicily.

19th
Large U.S. air force raids Sicily and Sardinia.
R.A.F. attacks communication centers in southern Italy. Destroys 40 planes, loses 8.

20th
R.A.F. bombs Schneider armament works at Le Creusot.
U.S. air power continues to pound Italian bases.

21st
Russia calls for second front in commemorating 2nd anniversary of German invasion.
Allied fliers raid Sicily again.

22nd
Allies bomb synthetic rubber plant at Huls and motor works at Antwerp.

23rd
British bombers wreck Palermo, other Allied fliers bomb Sicily and Sardinia.

24th
2,400-mile bombing shuttle service by Allied planes heavily damages Germany and Italy.
500 bombers raid French, Belgian, and Netherlands coasts.

25th
American-manned *Liberator* bombers wreck Nazi air base of Sedes, near Salonika (Greece).
300 U.S. bombers raid rail junctions and airfields of Chilivani (Sardinia).

26th
100 Flying Fortresses pulverize Italian port of Messina.
U.S. fliers in the North Pacific bomb Kiska.

27th
We again bomb Kiska.

28th
U.S. bombers from Britain damage targets in St. Nazaire and Beaumont-le-Roger (France).

29th
British and Canadian bombers raid Cologne, inflict extensive damage.
Allied planes bomb Italian port and naval base of Leghorn, other targets on Sicily and Sardinia.
U.S. fliers continue to attack Jap bases in the Aleutians.
U.S. forces under Gen. MacArthur land on Jap-held Rendova Island of New Georgia group, only 5 miles from Jap base at Munda.

30th
Reggio Calabria (Italy) and Messina (Sicily), terminals of ferry across Strait of Messina, are heavily bombed again.

For Heroism and Service

DISTINGUISHED SERVICE MEDAL

MAJ. GEN. HUGH J. GAFFEY, for exceptionally meritorious service in a position of great responsibility. From March 7 to April 10, 1943, Gen. Gaffey performed the function of Chief of Staff, II Corps. During this period the active operations of the Corps included the battle of El Guettar and adjacent combats. His courage, energy, foresight, force, and technical ability were largely responsible for the outstanding success achieved during these operations. Address, 1605 Watch Hill Road, Austin, Texas.

MAJ. GEN. ALFRED M. GRUENTHER, for exceptionally meritorious service in a position of great responsibility. From the initial planning for the landings in North Africa until his appointment as Chief of Staff, Fifth Army, Gen. Gruenther served as Deputy Chief of Staff, Allied Force Headquarters. He displayed ability to cope with great masses of detail and preserved an unruffled calm in the face of exceptional difficulties, lifting those associated with him above themselves. Address, 2745 29th St., N. W., Washington, D. C.

SILVER STAR

2ND LT. PEYTON H. BURKHART, for gallantry in action in Tunisia, North Africa. While acting as forward observer for his battery, Lt. Burkhart proceeded to a point in front of our own infantry elements in order to get observation denied us from other positions. In spite of fire from snipers and machine guns Lt. Burkhart coolly adjusted the fire of the battalion on targets of opportunity. Address, Box No. 592, Hominy, Okla.

S/SGT. EDWARD GREENBERG, for gallantry in action. On three separate occasions during a period of 11 hours in Tunisia, the command post at which Sgt. Greenberg was working was bombed and on one occasion a hand grenade, thrown from a plane, destroyed a vehicle in the command post. In spite of this enemy action, Sgt. Greenberg maintained steady composure and ably assisted in conducting fire. With complete disregard for his personal safety he remained at his post during these attacks. Address, 145 Cottage St., Chelsea, Mass.

CAPT. GEORGE J. HELMS, for gallantry in action. He observed a large number of friendly troops withdrawing. He investigated and was informed that one of the units had been attacked by tanks and was withdrawing to a new position. He was also told that there was nothing left to cover the front of his battalion. With this information he returned and radioed his battalion headquarters for permission to displace his battery in such a position as to cover the road against the approach of the tanks. This request granted, he moved his battery to positions that could effectively stop the attacking tanks. His battery had just reached its new positions when the enemy tanks attempted to break through. However, his guns laid on the tanks with such an intense concentration of direct artillery fire that they turned back. While the action was progressing Capt. Helms, with complete disregard for his own welfare, circulated among his men, helped dress the wounded, set up an aid station, fired two machine guns at enemy vehicles, issued additional orders in a cool and collected manner, and by his daring and heroic actions set an example of courage and calmness for all of his men. The initiative, leadership, heroism, and complete devotion to duty displayed by Capt. Helms reflect the finest traditions of the Armed Forces. Address, Green Level, Boone Mill, Va.

CAPT. FRED M. HIRONS, JR., for gallantry in action. In Tunisia, at an artillery observation post which had been under fire from enemy dive bombers and artillery for five hours, an enemy armored vehicle advanced to within 300 yards of the observation post and opened fire. Capt. Hirons took command of an infantry mortar section, accurately placing the mortar fire on the enemy armored vehicle. Destruction of the enemy vehicle and its crew was accomplished. Address, Ocean Drive at 33rd St., Jacksonville Beach, Fla.

MAJ. GEORGE V. KENMORE, for gallantry in action. On three separate occasions during a period of 11 hours in Tunisia, the command post from which Maj. Kenmore was directing fire was bombed and on one occasion a hand grenade, thrown from a plane, destroyed a vehicle in the command post. Many times during the day communications were disrupted by enemy bombs and shells but Maj. Kenmore kept communications open with radio and messengers. He massed the fire of the battalion during the day, stopping three tank attacks and one infantry attack. His coolness in action and devotion to duty are an inspiration to all. Address, 521 Jackson Ave., Americus, Ga.

LT. COL. BERNARD W. McQUADE, for gallantry in action. He distinguished himself in action against an armed enemy in Tunisia. His battalion was subjected to heavy and accurate enemy artillery fire. He went about the area seeing that his men had the maximum protection and safety. He continuously disregarded his own welfare by personally encouraging and leading his men during this fire. His action served as an example for his command. Address, 1664 Tenth Ave., Brooklyn, N. Y.

LT. COL. ORVILLE W. MARTIN, for gallantry in action in connection with military operations against an armed enemy. This officer was commanding a groupment of artillery as a part of a large force. While attempting to gain observation of the tactical situation with a view to adjusting artillery fire on antitank guns holding up the advance of the force, he was seriously wounded. After receiving only slight first aid treatment he contacted his executive officer and, though in great pain, passed on to him all pertinent information regarding the tactical situation. Then in turn he reported to his next two higher headquarters doing likewise. It was approximately three and one-half hours after he was wounded before he reached a medical clearing station. Address, 173 Broad Street, Oshkosh, Wis.

CPL. JOHN W. PERCER, for gallantry in action in Tunisia. When the position was attacked in the afternoon by enemy artillery fire the section chief was severely wounded. Cpl. Percer (then Private First Class) ran to him and immediately applied a tourniquet to his arm. He then covered the body of the wounded man, while the position was being heavily shelled, by placing himself on top of him. After the shell fire had abated he reorganized his section and was again very cool and collected when the shelling was repeated. Address, Boswell, Okla.

SGT. DONALD V. PETERSON, for gallantry in action in Tunisia. While acting as radio operator for the forward observer for his battery, in order to get better observation it became necessary for Sgt. Peterson to go in front of our own forward infantry elements. While so doing Sgt. Peterson was under intense fire from snipers and machine guns but managed to assemble his radio behind a small bush,

approximately two feet high, and continued to transmit fire commands. Through Sgt. Peterson's fearless action the battalion was able to fire on targets that had previously been beyond limits of observation. Address, 4027 Zenith Ave., S. Minneapolis, Minn.

PVT. ANDREW J. SAVINO, for gallantry in action in Tunisia. While manning a .50-cal machine gun in the battery defense position Pvt. Savino, until hurled to the ground by a large bomb, continued firing at enemy planes which circled in the sun and bombed and machine gunned the area. Address, 901 E. 167th St., Bronx, N. Y.

CPL. CHARLES P. SCELFO, for gallantry in action. His battery was displacing into a firing position close to a road. Before the guns were in firing position a sudden attack came in from the left front along the road. Without waiting for orders, Cpl. Scelfo placed his 37-mm antitank gun in the middle of the road directly in the path of the approaching tanks. Visibility was limited to fifty yards, but by taking advantage of the field of fire afforded by the road and by sighting on the tracer ammunition fired by the tanks he was able to deliver effective fire. When his fire became masked he moved his gun to a more vulnerable position in order to deliver more effective fire. Throughout the action he continuously disregarded his own welfare by deliberately exposing himself to intense and very close enemy machine gun and tank cannon fire in order to direct and control more efficiently the laying and firing of his gun. Address, 608 South Avenue, Rochester, N. Y.

PURPLE HEART

PVT. HAROLD W. PATZ, for heroism in the Fedala area. Address, Chicago, Ill.

SOLDIER'S MEDAL

SGT. HAYES S. NOBLE, for heroism in the battery motor park at North Ireland. A fire was discovered in the motor park. Sgt. Noble drove a vehicle covered with a burning camouflage net out of the line of vehicles. He then returned for another one which was on fire, and attempted to drive it away. However, the heat was too intense and he was forced outside of the vehicle. He guided it by standing on the running board while it was being towed away from the other vehicles. As a result of his prompt and voluntary actions and complete disregard for his own welfare he was able to get the fire under control, thereby saving valuable government property from damage by fire. Address, North Kenova, Ohio.

PVT. ESTILL PATTON, for heroism in Panama on February 6, 1942. Address, Prestonburg, Ky.

LEGION OF MERIT

BRIG. GEN. LAURENCE S. KUTER, for exceptionally meritorious conduct in the performance of outstanding services. Gen. Kuter has been in a position where the results of his executive efforts meant the difference between inadequate fighter support of the ground forces in the Tunisian campaign and the present ever-increasingly efficient aerial activity. Address, Washington, D. C.

BRIG. GEN. BEN M. SAWBRIDGE, for exceptionally meritorious conduct in the performance of outstanding service. As the original Assistant Chief of Staff, G-1, Allied Force Headquarters, he brought to his tasks a sound background of General Staff experience which he has applied to this position with vigor. His courtesy, keen judgment, infinite capacity for detail, and planning foresight have enabled him to cope successfully wth the personnel problems that have confronted the Allied Force, contributing greatly to the successful accomplishment of its mission. Address, 2800 West Viewmont Way, Seattle, Wash.

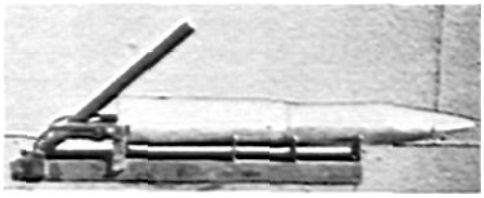
BRIG. GEN. ARTHUR B. WILSON, for exceptionally meritorious conduct in the performance of outstanding service. Gen. Wilson organized the Atlantic Base Section, brought it to North Africa, and took over an operating supply system with a minimum of friction and no break in operations. His energy, intelligence, and executive ability enabled him to deal successfully with the great problems which confronted him and resulted in an outstanding contribution to the success of the Allied Arms. Address, 2444 Virginia Street, Berkeley, Calif.

SHELL SEPARATOR

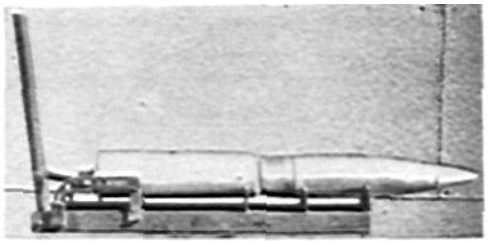
Publications of details of Capt. DeMoore's *Sepator for Semifixed Shell* (page 342 of the JOURNAL for May, 1943) has brought to light another device to do the same job. This one was devised by Pvt. Vern D. Bowles, FA, and has been used by all field artillery battalions of the 89th Division since early this year.

Pvt. Bowles' machine permits one man to "tailor" a round in three seconds. In a test run, three men with one machine prepared fifty rounds in five minutes—including taking the rounds from one pile, cutting the charge, and stacking the finished rounds in another pile. Working conventionally by hand, three men required over thirty minutes to prepare the same number of rounds, when a comparative test was conducted.

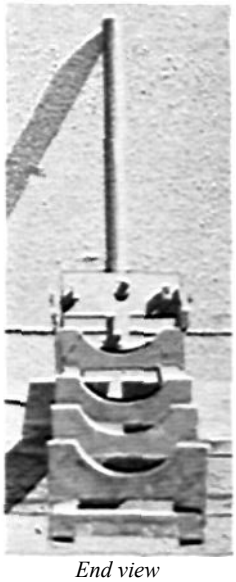
Probably the greatest advantage of this particular device is its low silhouette and horizontal operation, permitting its use with minimum exposure of the operator. Like Capt. DeMoore's, it is simple to make and requires practically nothing but wood.



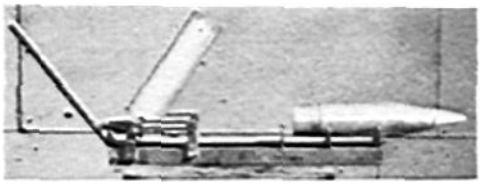
With handle pushed forward, two clamps catch the rim of the shell case.



Projectile remains in its cradle while case is drawn straight to the rear.



End view



When completely separated, case automatically is raised to a convenient position for removal of undesired increments. Handle is then pushed forward to guide case back onto projectile.

BOOK REVIEWS

JOURNEY AMONG WARRIORS. By Eve Curie. 488 pages; endpaper map; index. Doubleday, Doran and Co., Inc. $3.50.

Eve Curie travelled 40,000 miles and saw all that went on about her each place she visited. She talked with soldiers in the front lines, officials near the front lines, and civilians on the home front.

Her book, the first she has written originally in English, tells (in perhaps too great detail for war reading) what these people did, how they appeared, and what their thoughts were in relation to their fellow countrymen, their allies, and their enemies.

The book is not read rapidly—these days we are accustomed to rapid fire narrative and not to leisurely descriptions of places and people. We are accustomed to the battles themselves, not to the happenings of individuals and groups behind the lines. But please do not let the lack of speed deter you from reading the book in its entirety. It is a definite contribution and you will realize as you progress why Eve Curie is one of the better known and fascinating persons of today. Her balance is superb and her writing is excellent—you will find many ideas expressed so differently that you will be envious of her aptitude with the English language.

J. M. C.

A MATHEMATICS REFRESHER. By A. Hooper. 338 pages; index; tables. Henry Holt & Co. $2.50.

'Most every publisher seems to have ground out a "mathematics refresher" in the past year. Many of these books are "refreshers" in name only. Here, however, we have a sound, practical, workable volume that is truly what its name implies.

Mr. Hooper's approach is as fresh and untrammeled as that of Denning Miller (whose *Popular Mechanics* was reviewed here last February). His book is more compact, however, and is frankly designed more as a text. Its successful use by the R.A.F. led to this American edition when its author was transferred to Canada. And right now it is by all odds the favorite of all review texts at the Armored Force School.

Perhaps most appealing to me is the use of concrete, practical examples through all phases. A student is constantly conscious that every scrap of mathematical learning bears directly on some practical problem. This not only helps his interest—it also makes easier the process of learning, as familiar things are more readily grasped than are abstract examples.

COMBINED OPERATIONS. By Hilary A. St. George Saunders. 155 pages; illustrated. The Macmillan Company. $2.00.

Everyone has heard or read of the Commandos—yet very few know the details of their true, dangerous purpose. *Combined Operations* is the gripping story of the Commandos, their beginning, their purpose, and many of their courageous deeds. Without giving information to the enemy this book details many assaults which in no small way exemplify the Commandos' courage and devotion to duty. There are no individual heroes—but you will soon learn that *all* Commandos are heroes.

Before the book was written, the Chief of Combined Operations gave but one order: "Bearing considerations of security in mind, see to it that the account is accurate and truthful." According to the author this order was obeyed. I can well believe it.

If you like plenty of action you will like this book.

B. H. W.

YEARS OF THIS LAND: A Geographical History of the United States. By Hermann R. Muelder and David M. Delo. 238 pages; illustrated; index. D. Appleton-Century Co. $2.50.

Professors of related subjects should team up more often! History and Government and Geology here combine to give a living history of our country that is without a peer. Names and dates, battles, documents, and the like have no part in it. Rather, we realize that history is essentially geography in motion. The important things are the sources and causes, the growth and decay of ideas and ideals.

This combination of geological and geographical interpretation, along with sound historical background, creates a magnificent perspective. It is as dramatic and moving as that old film *The Covered Wagon* or (for those too young to recall it) the newer one, *Desert Victory*. It is the sort of thing that puts our developments in proper light, that makes one feel the grand sweep of the forces that made this country great (and, God willing, will keep her great despite forces from without and within). Although not written for that purpose, it clearly shows what it is we are fighting for.

THROUGH HELL TO DUNKIRK. By Henry de la Falaise. 166 pp.; endpaper map. Military Service Publishing Co. $2.50.

Last year the JOURNAL had the keen pleasure of publishing extracts from the war diary of the Marquis de la Falaise, who served as a Liaison Officer with the 12th Royal Lancers through the Battle

of France. We emphasized the operational aspects to give an incisive picture of the small unit in constant contact with the enemy.

This material and more has now been published in book form. New information has become available through the dispatches of Lord Gort, and more sidelights have been included. The results are magnificently well rounded details of a continuing period of combat. The reader simply lives at the front with this armored car outfit and its neighbors. We know of no other book which gives so true and living an account of a fighting front. *Through Hell to Dunkirk* is an important addition to military literature. All future combatants should be acquainted with the manifold lessons to be drawn from its pages.

COASTAL COMMAND. 143 pages; photographs. The Macmillan Co. $1.50.

The present war has been going on long enough now that magnificent official accounts can safely be released. *Front Line* is perhaps an example, although security requirements did not play a great part in determining the time of its release. In *Coastal Command* we have the Air Ministry's account of the part played by the Coastal Command in the Battle of the Seas, from 1939 to 1942. It packs a punch, too, from its detailed account of the tracking and sinking of the *Bismarck,* both backward and forward in time. Methods and men in the air, aboard ship, and on shore; tactics, technique, and equipment; humdrum routine patrols and quick, slashing action—these form the warp of *Coastal Command,* and scores of excellent photos provide the woof. The result is superb.

WHERE THE STORM BROKE. By Stanislaw Strzetelski. Roy Publishers. 257 pages. $2.50.

The author gives an inside story of the fateful weeks preceding the invasion of Poland. He tells how France and Britain refused to help Poland when Germany occupied the demilitarized zone of the Rhineland, saying that Germany was only taking back territory that was rightfully hers. He gives a day-by-day account of the defense and fall of Warsaw, and describes how the whole of Poland is under the rule of the Nazis, who have put into operation an inconceivably inhuman system of violence, torture, and extermination.

This most interesting book should be read by all who want to learn more about what set off the spark that plunged the whole world into this war.

M. K. W.

MANEUVER IN WAR. By Col. Charles Andrew Willoughby. Hilitary Service Publishing Co. 286 pages; illustrated. $3.00.

New?—only relatively, as it was published in 1939. Dated?—definitely not, except that it is tied in with the present as much as with the past. Theme?—the historical continuity of maneuver forms in the principal campaigns of the 18th and 19th centuries, with emphasis on the efficacy of flank maneuvers; in short, the solid background of much that has recently occurred, and more of which is to come. It is a book of solid worth.

VAN LOON'S LIVES. By Hendrik Willem Van Loon. 883 pages; illustrated. Simon & Schuster. $3.95.

Twenty-one chapters deal with the historical great. Hendrik Van Loon and several of his associates in Holland decide that it would be interesting to entertain for an evening, two or more guests from different periods. One evening, for example, was devoted to William the Silent and George Washington, another to Emily Dickinson and Frederic Chopin.

The actual meeting of the guests and their ensuing conversations are not all the book by any means. Before each meeting Van Loon writes a summary of the life of each guest for Frits, his friend and collaborator. The summary has just enough well known facts in it to recall the subject clearly, the rest being devoted to little-known but very interesting and enlightening facts. Then Van Loon and Frits

plan the menu, wine, and music for the evening—and this again adds to the reader's general knowledge of the periods involved.

Illustrations by the author add considerably to the interest of the volume, which while large, is a very entertaining addition to your Van Loon collection.

J. M. C.

ARMY FOOD AND MESSING (3d edition). Military Service Publishing Co., 1943. 429 pages; index; illustrated. $2.00.

The word "service" definitely belongs in this company's name, as it does its utmost to keep its material up to date and of maximum value to men in the field. A new chapter on cooking dehydrated foods truly keeps this book "the complete manual of mess management," as it is aptly subtitled. Advice is given for a variety of preparations of vegetables, eggs, meat dishes, and desserts, and detailed recipes are included for 100, 8, and 2 portions. Every mess should be interested.

WHAT YOU SHOULD KNOW ABOUT THE SIGNAL CORPS. By Harry M. Davis and F. G. Fassett, Jr. W. W. Norton & Co. 214 pages. $2.50.

This is not a technical manual: it is the story of the Signal Corps in plain everyday language. Like any other story, it describes ancient as well as modern methods of communications. The authors have accomplished a great deal in giving their readers a clear picture of the entire workings of Signal Corps personnel, equipment, and functions.

In most cases the Signal Corps is thought of only in the sense of communications, but its duties are far greater than most of us suspect. This book will open your eyes to the whats and whys of the Signal Corps and make you appreciate more fully the enormous part they play in the present war.

An excellent book, enjoyable reading, and a credit to its authors.

B. H. W.

DEFENSE. By Field Marshal General Ritter von Leeb; translated by Dr. Stefan T. Possony and Daniel Vilfroy. 159 pages; maps. Military Service Publishing Co. $1.00.

Von Leeb, an artillery general, carefully analyzed the operations of World War I in an effort to evolve a proper conception of defense. His theories were meticulously worked out. Beginning in June, 1941, he commanded Germany's northern group of armies against Russia; in this and succeeding campaigns he saw his theories put into practice—by the Russians!

Defense is in three parts. The first two, by von Leeb, analyze World War I's defensive aspects and present the German school's defense conceptions between the wars. Part III, by the translators, looks into World War II's strategical and tactical defense.

This little book is outstanding in many respects. It has sound historical background, and was written by a successful practicing general. It was translated by two staunch friends of the United States: a member of Princeton University's Institute for Advanced Study, and a young French officer who wrote that excellent study of the Battle of France, *War in the West*. Last but far from least, it is presented by the sole publisher who had a sustained interest in military books through the doldrum days of peace, and who did so much for military authors during that period.

THE FIRST CENTURY OF FLIGHT IN AMERICA. By Jeremiah Milbank, Jr. Princeton University Press, 1943. 240 pages; index; illustrated. $2.75.

Few of us realize that aviation in this country dates back to 1784, when a thirteen-year-old boy made a balloon ascension near Baltimore. Its first century saw not only such tricks as ascensions on horseback, but also cross-country flights of over 800 miles, the introduction of air-mail, and the beginnings of aerial photography.

This early material has been well gathered together by Mr. Milbank and put into a form both interesting and attractive. Collectors of Americana will take keen delight in it. And both flyers and laymen will find this new book an entertaining introduction to the history of American aviation.

PLANE AND SPHERICAL TRIGONOMETRY (With Four-Place Tables). By William C. Brenke. The Dryden Press. 259 pages. $1.90.

Here is a new textbook of trigonometry that will aid those who are in or preparing to enter many branches of the Armored Forces. Many topics are included which should prove of great interest to those concerned with sea or air navigation or long range artillery fire. The author has done an excellent job of presenting illustrations and examples of problem-solving, to help refresh the minds of those dealing with these subjects. All in all, this is an excellent book.

B. H. W.

MASTERS OF MOBILE WARFARE. By Elbridge Colby. Princeton University Press, 1943. 155 pages; illustrated. $2.00.

An acquaintance with military history will pay dividends to everyone in the army, and also help civilians understand what current and future maneuvers are all about. It is fine, then, to have this splendid account of those masters: Marlborough, Frederick, and Napoleon. It ties in with present events, too: near the Mareth Line the Eighth Army's attack against a strong point of the lines astounded Rommel—and defeated him—even as Marlborough dismayed the French at the Lines of Brabant in July of 1705.

Col. Colby did not write a biography. His book isn't always in chronological order. But he drives home his points with a clear, eminently readable account of striking examples that will stick in your minds. Every commander of a unit (from platoon on up) must use mobile power with precise and proper timing. Each can learn much of these lessons from history. Each will learn much from *Masters of Mobile Warfare*.

AMERICA'S BATTLEFRONTS. By Frederick Gruin. The Foreign Policy Association. 94 pages; maps. 25c.

This illustrated booklet shows where our fighting men are being placed. It gives a short description of 31 countries and islands with 8 good maps. It is brief, yet gives a world of information and is well worth the 25c and the short time it takes to read it.

M. K. W.

ONE HUNDRED AND SEVENTY-FIVE BATTLES. By Roger Shaw and Col. S. C. Vestal. Military Service Publishing Co. 268 pages; index. $2.00.

These keen thumb-nail accounts are all interesting and informative, although of course not all would be termed "decisive." No theories of war are put forward, merely factual material boiled down starkly—but not at all dully. From Marathon to Addis Ababa—if "they" are not all here, most of them are. Alhough not new, this is a reference book with which too few are acquainted. You'll find it worth your while.

WHAT TO DO ABOARD A TRANSPORT. By "A Group of Scientists." 260 pages; illustrated; index. The Infantry Journal. 25c.

As interesting ashore as afloat, this little pocket-sized book has very little bearing on life afloat. Most of its contents are basic; chapters include data on weather, celestial bodies, time, navigation, forms of shore lines, sea life, etc. Titles are suggested for further reading on the various subjects—a useful feature.

MODERN JAPAN AND SHINTO NATIONALISM. By D. C. Holtom. 173 pages; index. University of Chicago Press. $2.00.

Thirty years in Japan representing a mission society and teaching religious history and modern languages in Japanese colleges, gives Mr. Holcom an excellent background for outlining the State's perversion of religion to serve its own purposes. Shinto teaches the divine mission that all people should be "united" under Japanese military domination. State Shinto has become *the* Japanese religion—and even Buddhism and Christianity have been forced to identify themselves with its ideals, and so are losing their identities.

SOLDIERS UNMASKED. By Col. William Addleman Ganoe. Military Service Publishing Co. 133 pages. $1.50.

A few years ago Col. Ganoe gave a series of radio talks about the American soldier. So popular they were later published, they are as worth reading now as then.

From his wealth of historical knowledge Col. Ganoe has distilled a graphic picture of what our army has been called upon to do through the years; how it was managed and mishandled by powers-that-were; how its solid achievements contributed to the development of the United States. More, it is a highlighted history of our country, especially valuable where it covers episodes glossed over by more formal histories. This is a fine little book to read or re-read—especially as an antidote to some more recent publications.

FIELD ARTILLERY: BASIC. 1505 pages. Military Service Publishing Co. $5.00.

For many years this publisher has supplied the ROTC texts for several branches of the service. Needs of the Field Artillery have been filled by the familiar "red books" of the Field Artillery School. Now, however, a quite comprehensive single volume is available, covering a great quantity of basic material common to all arms, as well as artillery details such as service of the piece (for many weapons), antitank weapons, materiel and ammunition, fire control instruments, battery communications, duties of the BC detail, care and operation of motor vehicles, etc., etc.

In so monumental a work there are naturally some places where the information is obsolescent (such as the data on BD-9 switchboards). Wartime censorship requirements play their part too, in delaying the general publication of some new developments. But principles remain, and here we have a thorough-going book that deserves a place in every artillery day-room. Be sure your shelf is stout, though—this tome weighs 5¼ pounds!

CARONI GOLD. By L. R. Dennison. 274 pages; photographs; endpaper map. Hastings House. $2.50.

East of the Orinoco, in Venezuela, lies the Klondike of South America. Here is a land of mountains and jungles, savannahs and forests, Indians, reptiles, and insects. Some years ago Mr. Dennison investigated this territory for a New York syndicate, then for a time was *alcalde* of Paviche on the weird and wonderfully rich Caroni River. His lively, detailed account gives an intimate view of the daily life of this "coming" area.

WE FIGHT WITH MERCHANT SHIPS. By M. B. Palmer. 307 pages; photographs. The Bobbs-Merrill Co. $2.75.

Peacetime doldrums. Shadow of a coming war. "Jerry" Land and the Maritime Commission. Dearth of yards, then Henry J. Kaiser. Few crews, and the establishment of training schools. Nebulous "neutrality" phases—and a shooting war. Lone wolves and convoys. Torpedo, shell, and bomb. Atolls and frozen Murmansk.

These are but part of the story of our Merchant Marine, which a Washington writer for *Newsweek* has put together for the benefit of all of us. And it's a good story, rounded out with details that were completely new to this reviewer. Its who's, what's, why's, and how's make mighty good reading.

FOUNDED UPON THE SEAS. By Walter Oakeshott. 200 pages; illustrated. The Macmillan Co. $3.50.

Illustrated by contemporary maps and drawings, Mr. Oakeshott gives us a fascinating narrative of some English maritime and overseas enterprises during the period from 1550 to 1616. Drake, Hawkins, Raleigh, and Cabot are among those who come to life. Their exploits in this crowded period were brilliant, but for full appreciation must be laid against the social and political events of the time. This Mr. Oakeshott has done, in such manner that the period itself is recreated in a reader's mind. Intrigue, the lure of riches, Mary's somewhat enigmatic struggle with Elizabeth, Pocahontas—all play their part. Grand yarns, well told, historically accurate.

THE ARMY OF TENNESSEE. By Stanley F. Horn. 479 pages; illustrated; bibliography; index. The Bobbs-Merrill Co. $3.75.

The Army of Northern Virginia has been analyzed, dissected, and reviewed in great detail. Its exploits and defeats have been retold, and its leaders examined. Until recently, however, there has been no coherent account of the South's Army of Tennessee—only separate biographies of some of its commanders.

That gap has been splendidly filled by this detailed and well documented narrative of its operations. Through Shiloh, Chickamauga, and many another battle it fought on and on—even after Appomatox. This was a flashing yet a sturdy army. It drew strength from the vigorous men of the hills, and bore no less a load than did its companion to the east which has basked in the glamor of operating in the "Old Dominion."

Its author found the writing no task of pedantry. Born and reared in the heart of the Army's activities, he is steeped in its events and traditions. Thoroughly acquainted with his subject, he breathes life into its men and their doings. Result: a fine addition to any library (and understanding) of the Civil War period.

MUTINY IN JANUARY. By Carl Van Doren. 270 pages; illustrated; index. The Viking Press. $3.50.

Our Revolutionary Army had its glorious days, but also one deeply shameful incident. In January, 1781, a considerable group of soldiers mutinied. Histories have generally ignored this episode, through which are found the trails of spies and other enemy agents. The mutiny was as brief as it was dramatic, and Mr. Van Doren tells it as a swift narrative. Documentation is given for those interested in sources, but these notes are grouped in an appendix where they won't slow the reader's pace. Although Washington, Lafayette, and others appear, they are sheerly incidental. The story is that of the mutiny and the mutineers themselves.

JAPAN'S MILITARY MASTERS. By Hillis Lory. 235 pp.; appendix; index. The Viking Press. $2.50.

This is an excellent book by a man who has made it a point to know the Japanese army set-up. The book deals with the army, touching on other matters only where the army has several fingers in them.

Mr. Lory tells how the raw recruit has his training started even before he is inducted. The entire training is built around working for and winning glory for the Emperor, who is a deity in Japan.

Emperor Meiji's rules for soldiers are gone into in some detail; they explain much of the entire Japanese attitude. The extensive and intensive training on top of the proper mental foundation result in a whacking good soldier, afraid of nothing except capture. This is, at least to me, the most interesting part of the book.

The officers of the army are trained rigidly also, and are on excellent terms with their men. They are now chosen from the upper class down through the middle class, instead of from only the upper class, as formerly.

The author goes briefly into the political power of the army, the discord that was rampant for a time, and the factions thereof, and ends the book with a very worth-while chapter on how we are apparently still underrating Japan, and badly. He says that the last thing we should allow Japan is the time in which to consolidate her gains throughout Asia. There is too much there to help Japan wage a long war.

J. M. C.

I WAS ON CORREGIDOR. By Amea Willoughby. Harper & Bros. 249 pp.; map. $2.50.

Mrs. Willoughby gives us a simple, honest account of her experiences in the Philippines and Corregidor. She tells of the long weeks spent in tunnel on Corregidor under conditions of hardship and danger, and of the fortitude shown by all while enemy bombs and shells burst constantly overhead. The touching faith of the men who strongly believed in the resourcefulness of the folks "back home" gives one food for thought.

Her escape by submarine to Australia was a notable experience in itself. This personal story is one of the epics of this war.

M. K. W.

THE WIND THAT SWEPT MEXICO. By Anita Brenner and Geo. R. Leighton. 299 pp.; photographs. Harper & Bros. $3.75.

A new kind of history book and one I enjoyed. It deals with the Mexican revolution from 1910-1942. Its first hundred pages contain what must necessarily be—a brief account of the actual events that took place during the period, and the reasons for them. Anita Brenner wrote the text.

The rest of the book contains 184 photographs depicting the story, and the caption of each is taken from the text of Miss Brenner. Mr. Leighton has done an excellent job of compilation. The pictures are arranged in the order of the text, so that the net result is that you have a story followed immediately by a pictorial review of the story. A reader does not have to interrupt himself to look at a picture in the middle of a sentence so he can turn a page. One who prefers pictures has an abundance thereof, but also enough length to each caption to get the essentials of the story.

I hope this book is enough of a success that the publisher will bring out others of the type.

J. M. C.

CIRCUIT OF CONQUEST. By Relman Morin. Alfred A. Knopf, Inc. 361 pp. $3.00.

Here is a book that is different. Told in a narrative style, yet all true, the author, a crack AP reporter, after three years in Japan travelled in Shanghai, Manila, Dutch East Indies, Malaya, Burma, Thailand, and Indo-China gathering behind-the-scene details of where the Japs would strike, what quality of men, weapons, and spirit would oppose the Allies, and what really happened and will in the Eastern Hemisphere.

He was arrested in Saigon as a spy, and finally was exchanged with other Americans. It is a well told and highly interesting book.

M. K. W.

THE WAACS. By Nancy Shea. Harper & Bros. 234 pp.; index. $2.50.

This is a useful book to those who are in the Women's Army Auxiliary Corps and those who contemplate entering the Service.

It gives the whys, whats, wheres, and hows. How to enlist, what to take with you, what to do when you are inducted, living conditions, training, application for Officer's Candidate Schools—all are fully entered into.

A glossary of military words and expressions is given. There is a chapter on military courtesy, another on different training centers. It is a complete book of information on the WAACS.

M. K. W.

ROUND TRIP TO RUSSIA. By Walter Graebner. J. B. Lippincott Co. 216 pp.; illustrated. $3.00.

An excellent book written by a man who was present and witnessed some of the most courageous and history-making episodes the world has ever known. Mr. Graebner, veteran reporter for *Time, Life,* and *Fortune,* has included a great many of his dispatches in this book. Some of his accounts you may have read, but many you will see only in this book.

To appreciate the great struggle and sacrifice Russia has made and is making in this war it is necessary to get the inside story as a skilled writer as Mr. Graebner can tell it. This is just what this book has to offer. It is very interesting reading, and once inside the cover you will not lay it aside until you have finished reading it.

B. H. W.

IS GERMANY INCURABLE? By Richard M. Brickner, M.D. 309 pp.; bibliography. J. B. Lippincott Co., 1943. $3.00.

Dr. Brickner's book is a presentation of a psychoanalyst's view of the problem of Germany. It is his conclusion that German leaders and a large part of the German people are suffering from paranoia, that is to say, a delusion of persecution which largely shows as a megalomania of superiority. The first part of his book is devoted to a discussion of the manifestation and treatment of paranoia in

individuals. In the second and shorter half of the work Dr. Brickner presents evidence taken from the writings of German nationalists of the last hundred years which tends to support his thesis.

If there is to be any objection raised against this book, it must be against the evidence. Dr. Brickner, while a trained psychoanalyst, shows a regrettable lack of historical perspective. He cites freely from the writings of the German nationalists and fascists, to illustrate his point, without the slightest recognition of the fact that neither nationalism nor fascism are peculiar to Germany, but are distinctly European phenomena of the last century. Germany is not the only country subject to the ills of fascism, though one may willingly concede that Nazism is the most extreme form of that disease. The analytical value of the book remains doubtful due to the failure of the author to show why the equally extreme writings of French, Italian, Slavic, and even English nationalists do not indicate that those countries are also paranoids. A century of complex political, social and economic developments cannot be reduced to a psychological formula.

H. A.

REMEMBER PEARL HARBOR. By Blake Clark. Harper & Bros. 300 pp.; illustrated. $2.50.

Here is a revised and expanded edition of a fascinating account of what took place on that eventful day. The author of this book was present at the time, and while it was impossible for him to be every place and see everything, he did an excellent job in piecing together the stories of eye-witnesses he was able to obtain.

In the first accounts of the attack we read in our newspapers some important facts were necessarily omitted. This is not true of the accounts contained in this revised and even more complete edition of *Remember Pearl Harbor,* which should be on your must list. Not only is it an excellent story, but it contains vital information that will open your eyes to just how gruesome the attack was, and make your desires stronger for the revenge (a thousand fold) which is sure to come.

B. H. W.

THE AIRPLANE AND TOMORROW'S WORLD. By Waldemar Kaempffert. 33 pp. Public Affairs Committee, Inc. 10c.

No. 78 in this series of factual pamphlets was prepared by the Science Editor of the New York *Times*. It is an intelligent review of the changes made by the war time expansion of air lanes.

SOUTHWEST PASSAGE. By John Lardner. J. B. Lippincott Co. 302 pp.; illustrated. $3.00.

John Lardner, sportswriter turned war correspondent, gives us an account of our first round in the greatest fight of all times. He witnessed the start from a ring-side seat and tells his story in a manner no different than he would use to describe a fight in Madison Square Garden. He was on the first convoy that sailed westward, and to the members of that group this book should have a personal appeal.

Reporting war is a serious matter, and John Lardner treats it so—but he cannot eliminate his own faculty of not being too serious himself. The reader will be delighted with the humor in *Southwest Passage,* which lends a great deal toward making it pleasant and enjoyable reading.

B. H. W.

A FRENCH OFFICER'S DIARY. By D. Barlone. 156 pages; end paper map. The Macmillan Co., 1943. $2.00.

In a certain general sense the pre-combat portion of this book might have been written about any of the principal allied countries. It has the old familiar note of the complacent business-and-pleasure-as-usual attitude that, despite warning examples, somehow manages to hold on up to the hour of actual combat.

The book presents a French officer's interpretation of military events from day to day over the period from August 1939 to October 1940. Mobilization in 1939 failed to jar France appreciably.

She made such concessions as she had to make to military preparations, and trusted blindly in her Maginot Line.

The author, veteran of World War I, with military acumen and independence of thought senses something of the insecurity of the country and even dares to question the invulnerability of the Maginot Line. His diary expands at times into heated comment, personal reflections, and vivid descriptions. It is more than the mere skeleton outline of events that the modest title implies.

Determination and strength and courage stand out in the officer's hatred of tyranny and his decision to resist it against all odds. His diary becomes an account of a military adventure leading eventfully from France to Casablanca and finally to England for service under General de Gaulle.

F. E. J.

SOUTH FROM CORREGIDOR. By Lt. Comdr. John Morrill. U.S.N. and Pete Martin. Simon & Schuster, Inc. 249 pp. $2.50.

If you want a book that will keep you engrossed from beginning to end, read *South From Corregidor*. It is a true story of the fall of Bataan and Corregidor. You can almost hear the bombs falling, the scream of machine gun bullets, and the cries of the wounded. Then at the end, 18 men escaped on a 36 foot boat and arrived safely in Australia after 31 days of dodging Japanese submarines, planes, and troops. You suffer their suspense when the motor of their boat refuses to run, when high seas almost swamp them, and when they run blindly up to an island occupied by the Japanese.

Take time out for this book!

M. K. W.

LANDS DOWN UNDER. By C. Hartley Grattan. 93 pp.; illustrated. American Council, Institute of Pacific Relations. 40c.

Again the Institute of Pacific Relations has given us a pamphlet well arranged and well illustrated, which quickly acquaints us with part of the Pacific area. This new one covers Australia and New Zealand.

PASSENGERS TO MEXICO. By Blair Niles. Farrar & Rinehart, Inc. 390 pages; index. $3.00.

This is a biographical history of the last invasion of Mexico. Napoleon, Maximilian, and Carlotta are shown to us in all their human weaknesses, jealousies, and dreams of a Mexican Empire. The strength and determination of Juarez ("the little Indian") and the Mexican people to resist French tyranny is vividly described.

From letters, journals, and memoirs the author has put together a swiftly moving narrative.

M. K. W.

FANTASTIC INTERIM. By Henry Morton Robinson. 329 pages; index. Harcourt, Brace and Company. $3.50.

Events in the years between Versailles and Pearl Harbor, summed up with incisive directness in this "hindsight history" by Henry Morton Robinson, are shown in a truly fantastic light. They call into question our national maturity and integrity, and make a travesty of democratic principles.

The author does not attribute the alarming departure from democratic ideals entirely to willful human depravity. He recognizes the post-Versailles period as a singularly critical moment in history, and he records the social, economic, and political blunders with due regard to their contributing causes.

This fantastic period bears out the sociological fact of cultural lag with overwhelming emphasis. Social institutions geared to horse-and-buggy days were pitifully inadequate in the new day of incredible technology. A touch of social irony finds expression in the fact that the cultural lag increased in damaging coincidence with the nation's most desperate need for institutions serviceable to its technological development.

The people held on perfunctorily to their archaic institutions, at the same time striking out blindly in pursuit of the mechanical promises

of technology, big new motor cars, radios, machines of all kinds. The inconsistency was bound to lead to demoralization, superficiality, insincerity, and a warped sense of values, all combining in time into national neurosis.

It is against this background that the feeble leaders of the time, headliners of the hectic interim, are shown. Parading across the American scene, their special guilt or shame or folly mercilessly sketched in by the author, they comprise a smudgy section of a sort of national family album. Here and there, in welcome relief, is a face with character and courage, but for the greater part there is weakness, and greed, and cruelty.

Fantastic Interim is a fearless, provocative book with disturbing implications.

F. E. J.

LAST MAN OFF WAKE ISLAND. By Lt. Col. Walter L. J. Bayler. Bobbs-Merrill Co. 362 pages; illustrated; index. $2.75.

The only man to escape from Wake Island; the only Marine to fight on Wake, Midway, and Guadalcanal and still live to tell the tale. His is a breathtaking book which holds you spellbound throughout its entirety.

Read it and learn how those plucky Marines held Wake Island for 13 bloody days' fighting against overwhelming odds; how a battery of artillery held their fire until sure of knock-out hits and routed a Japanese task force of 12 vessels, sinking a cruiser, two destroyers, and a gun boat and damaging several others; how two and three planes went up to battle the Japanese, outnumbered 10 to 1; how two planes in the face of heavy aircraft fire sank a transport, returning to the base for repeated supplies of bombs time and time again.

Countless other episodes in this remarkable book should be an inspiration to every red blooded American. Nothing can better exemplify the American courage than the farewell words received by Col. Bayler as he left Wake Island, "Send us more Japs."

B. H. W.

TOTAL ESPIONAGE. By Curt Riess. G. P. Putnam's Sons. 303 pages; chronology; index. $2.75.

Here we have the inside dope on British, French, German, Russian, Japanese, and American espionage organizations. This book tells how the Gestapo was started, copying from the Japanese and Russians. It answers the questions of why the attack on Russia, Hess's flight to England, and the murder of Trotsky.

Total Espionage is highly interesting, and should be read by those who wish to learn just how ruthless and dangerous Germany is in this phase of the war.

M. K. W.

NURSES IN ACTION. By Col. Julia O. Flikke. J. B. Lippincott Co. 239 pages; illustrated. $2.50.

Beginning with the Revolutionary War and ending with the present one, Colonel Flikke relates the struggle the nurses' corps has made for recognition. The author devotes a good part of the book to the training, living conditions, customs, and opportunities of the Army nurse. She answers almost every question being asked by young women of our country.

M. K. W.

WAR EAGLES. By Col. James Saxon Childers. D. Appleton-Century Co. 350 pages; illustrated. $3.75.

A fascinating true-to-life story of American pilots in that famous Eagle Squadron of the R.A.F. is told in this remarkable book For quite some time it seemed that the Air Ministry would not give out information on the Eagle Squadron, but Col. Childers, a member himself, gained access to official records and brings us this story.

This book is a great tribute to those young American boys who loved flying and who could not wait to see whether America would be drawn into the conflict. Their heroic deeds and great courage made an everlasting impression on all that knew them. The author not only gives a vivid picture of their many battles but he describes their

everyday life. You will be interested in knowing the mannerism and characteristics of these men both in and out of combat.

It is exceedingly interesting from the first to the last page—filled with plenty of action that will make you live the life of the members of the Eagle Squadron.

B. H. W.

I SERVED ON BATAAN. By Lt. Juanita Redmond. J. B. Lippincott Co. 167 pages; illustrated. $1.75.

The author is one of the few nurses who escaped from Bataan and Corregidor. Her story is told simply and plainly, but reading between the lines you can see all of the indescribable horrors she and all the rest went through. Short of food, medical supplies, and clothing, they all struggled to do the best they could to mend the broken bodies of the brave soldiers fighting for our freedom. It is a story of the typical American woman's courage and fortitude.

M. K. W.

THE HERO IN HISTORY. By Sidney Hook. 267 pages; index. The John Day Co. $2.50.

Sometimes a title well describes a book. Again, the contents have only a superficial relation to the title—as in this case. True, names and events pop in and out, but in a most superficial fashion. Mr. Hook figures that a real hero is an event-making man, as contrasted with one who is only eventful. He wordily beats about the bush, rehashes a few earlier books, and perhaps eventually makes his point. But he made himself and the typesetters a lot of unnecessary work in doing so.

FRONT LINE. The Macmillan Co. 159 pages. $1.50.

This should be one of your "must" books. It is the official story of the operation of Civil Defense in Britain. We can learn from it lessons in organization, functions, and techniques of different defense groups—the Wardens, Firemen, Rescue Men, First Aid parties, Ambulance Drivers, First Aid Posts, Messengers and Policemen.

Front Line describes in detail the various types of blitz which the Germans have attempted on London, with over 100 magnificent pictures vividly showing the destruction, chaos, and ruins heaped upon that city.

M. K. W.

CHILE: A Geographic Extravaganza. By Benjamin Subercaseaux; translated by Angel Flores. 255 pages; endpaper map. The Macmillan Co. $3.00.

Scion of a distinguished family of French descent, one-time medical student, practical psychologist, and active in public affairs, Sr. Subercaseaux gives us an understanding picture of his native land. He has a Gallic sensitiveness to surroundings, a sharp eye for what he sees, and a thorough knowledge of the several regions of that long, thin thread which forms most of South America's Pacific coast. Working generally from north to south, the men (and women) are studied together with the countryside, the cities, and the activities in each zone. The result is a graphic portrayal which is the best thing short of an actual visit to Chile.

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