

Coast Artillery JOURNAL



November December 1938

PRIZE ESSAY COMPETITION 1939

First Prize \$200.00
Honorable Mention Prizes . 100.00

It has been decided to conduct a prize essay competition for 1939. The details are tabulated below.

a. PERMISSIBLE COMPETITORS:

Any member of the Coast Artillery Association at date of submission of essay.

b. SUBJECT:

To be selected by the author. Appropriateness of subject for Coast Artillery readers is a point to be considered in awarding prize.

c. PRIZES:

(1) *Number:*

(*a*) One First Prize—\$200.00. Not to be awarded if no essay submitted is outstanding.

(*b*) Not to exceed two Honorable Mention Prizes—\$100.00 each.

(2) Awarded by Chief of Coast Artillery upon recommendation of Board of Officers appointed by him. Membership of Committee to be published only after awards for the year have been made.

(3) *Time limit.*

No essay received after September 30, 1939 will be awarded a prize.

(4) *Payments.*

Payments of prizes will be made immediately after awards are made. All essays submitted become the property of COAST ARTILLERY JOURNAL. Any person receiving a prize for an essay will receive

no other compensation. If any essay is published the author of which received no prize, such author will be paid at the usual rates.

d. HOW SUBMITTED:

Essays will be submitted to the Editor of the COAST ARTILLERY JOURNAL in a sealed envelope bearing the notation "Prize Essay Contest." The copy submitted will contain nothing to indicate its authorship, will be signed by a "nom de plume," and will be accompanied by a separate sealed envelope containing the nom de plume and also the name of the writer. This latter envelope will be delivered to the Chief of Coast Artillery when received and will be opened in the presence of the Editor of the COAST ARTILLERY JOURNAL after the relative merits of the essays have been determined.

e. FORM:

(1) Essays should be limited to approximately 8,000 words, but shorter articles will receive consideration.

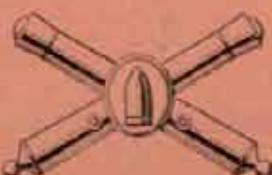
(2) Three typewritten copies of each essay will be submitted on letter size paper (one original, two carbons) with double-spaced lines. At least one of any illustration will be a drawing, tracing, or photograph, not a blue print or brown print.

THE COAST ARTILLERY JOURNAL

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NOVEMBER-DECEMBER, 1938

MAJOR AARON BRADSHAW, JR., C.A.C., Editor



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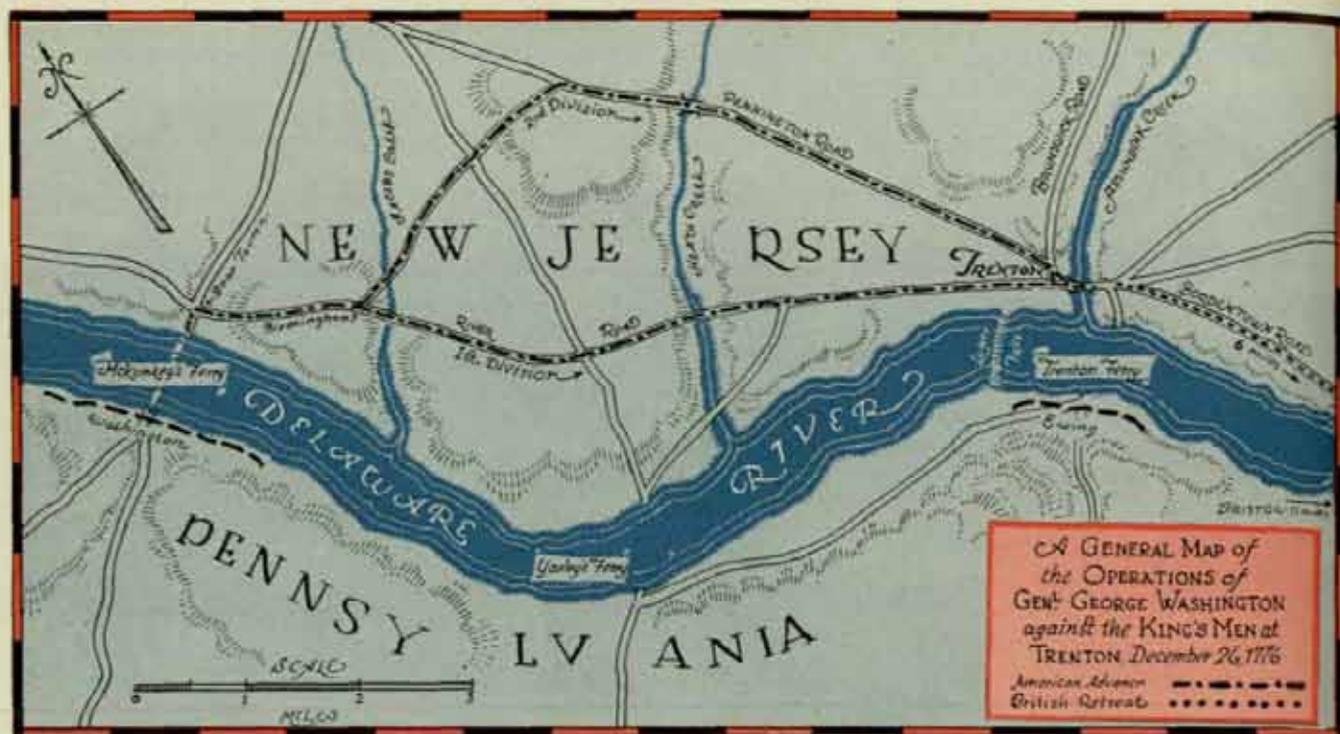
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Map 1

contemporary correspondent, "General Howe had a mortgage on the rebel army for some time, but had not foreclosed it." Even so, Washington could muster only about 3,000 effectives when he halted at Trenton on the north bank of the Delaware, and that small force was daily diminished by desertions. New Jersey's population was far from unanimously pro-American. Many among the discouraged troops fell victims to the blandishments of local Tory farmers. Others, whose enlistments would expire on the first of the new year, decided that a few days more or less would make little difference, and silently vanished. And recruits to take their places were few.

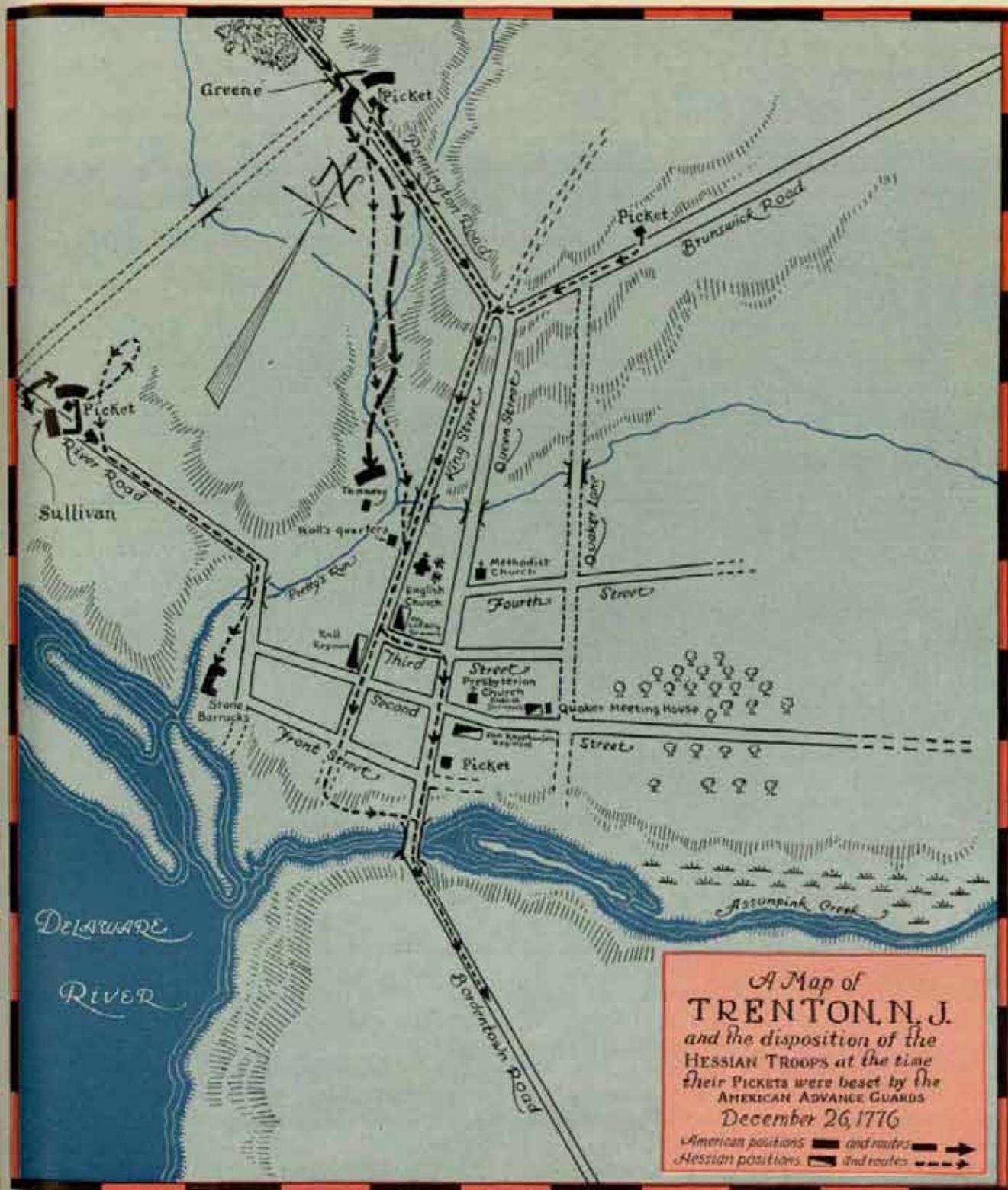
Frantic demands by Washington and his generals did bring in a detachment of New Jersey militia. The Continental Congress supplied a battalion of infantry from Maryland. And Philadelphia—always to be depended on in an emergency—furnished three battalions of infantry, a battery of artillery, and a troop of light horse, totalling approximately a thousand men. But these few reinforcements were all.

Knowing that his stay in Trenton would, of necessity, be short, Washington immediately laid plans to take his army over the Delaware into Pennsylvania—and, if need be, to continue south into Virginia and keep the British from following him across the river. Punts, gondolas, and scows, and the big "Durham" boats used for river freightage, were commandeered wherever found along the Delaware's bank; and the entire American force was safely ferried to the Pennsylvania shore on December 8th. The move was just in time. A couple of hours later the British marched gaily into Trenton with much ceremony, and a dashing display of uniforms, colors, and martial music. But reaching the river, their aplomb was somewhat shaken at finding, instead of boats, a salvo of grapeshot from the

opposite bank. After considerable reconnoitering up and down the stream, accompanied in large part by joyful bursts of cannonading from the escaped Americans, the English were forced to the conclusion that their pursuit was stymied until the Delaware froze hard enough for them to cross on the ice. They established themselves as comfortably as possible to await that fortuitously frigid moment.

The British force consisted mainly of two brigades of Hessian mercenaries commanded by Colonel von Donop. The stout colonel went into winter quarters at Bordentown (Map 1), a few miles to the south, with one brigade of his Germans, a battery of English artillery, and the 42d Highland Regiment, more familiarly known as the "Black Watch." At Trenton, Colonel Johann Gottlieb Rall was in command of the other brigade of three regiments of Hessian infantry, fifty Hessian jägers, a Hessian artillery detachment, and a score of British dragoons, about 1,400 men in all.

The Hessians were trained soldiers. By nature and environment they were uncouth and violent, completely indifferent to everything and everybody outside their own particular military activities. England had hired their courage and brawn from Germany's petty princes to save her own troops from the distasteful colonial service; she paid seven pounds, four shillings, and four pence per Hessian. Every Hessian killed counted as one newly mustered, and three wounded equalled one dead soldier on the tally sheet. Hessian regiments were designated by their commanders' names and achieved further individuality by the distinctive colors of their uniforms. The outfits stationed at Trenton were the Rall Grenadiers, clad in dark blue; the von Lossberg Fusiliers, in brilliant red coats; and the von Knyphausen Grenadiers, in somber black. The jägers



Map 2

wore green with red facings and the artillery sported blue coats with red lapels and white borders. All ranks affected fierce mustachios stiffened with boot blacking, and heavily powdered hair gathered in a queue that reached nearly to the waist. Besides rifle, bayonet, ammunition, and pack, each Hessian file carried a brass-hilted sword and wore a lofty, brass-fronted hat.

Trenton at that time was a sleepy little village owing

what prominence it had to the fact that it lay at the head of freight navigation on the Delaware, and on the post road between New York and Philadelphia. The main portion of the village centered around a triangle of three main streets, beginning a short distance from the river bank. (See Map 2.) The base of this triangle was formed by Front Street, parallel to the Delaware. At the western limits of the town, Front Street was joined by the River

Road, and to the east Front Street dwindled away in an apple orchard bordering the low ground by Assunpink Creek that bounded Trenton on the south and east. The two sides of the triangle were King Street to the west and Queen Street to the east, uniting on the high ground just north of the village. Here they made a junction with the Pennington road to the northwest and the Brunswick road to the northeast. Almost due north from the triangle's apex was a lane leading to a large private estate. North of Front Street, and paralleling it, were, in order, Second and Third Streets. Second Street also connected with the River Road west of King Street and continued to the Assunpink east of Queen Street. Third Street began at King Street and ended at the Quaker Lane, situated east of Queen Street. Still farther north was Fourth Street, joining Quaker Lane and Queen Street. King Street's southern extremity was at Front Street, but Queen Street cut across Front, spanned the Assunpink and led to the Trenton Ferry and Bordentown Road. In all our history no terrain was destined to play a more important part than these pretty country streets and roads of Trenton, and it is a pity that their original names have been lost in such modernized identities as Warren, Broad, Willow, Hanover and State Streets.

Rall established headquarters in the home of Stacy Potts about halfway down the west side of King Street; his namesake regiment had billets near the corner of King and Second. The von Lossberg unit was also on King Street, the von Knyphausens were in the vicinity of Queen and Second, the jägers in some French and Indian War barracks of stone where River Road entered Front Street, and the artilleryists in the Methodist Church on Queen Street and the English Church opposite Rall's quarters on King Street. Two cannon were parked here and the rest in the yard of the English Church. The detachment of English dragoons assembled by itself in the austere precincts of the Quaker Meeting House on Second Street.

The Hessian commander, with all his troops thus convenient to his call, consolidated his position. It did not take him long, nor consume much mental energy. On the Brunswick road, just east of its junction with King and Queen Streets, he placed a picket of a captain, three noncoms, and seventy men. Complementing this picket on the Pennington road was a post of a corporal and fifteen men. Down on the River Road to the west of the town he stationed a detachment of a commissioned officer and fifty jägers, to patrol the rear bank of the Delaware and watch for American activity on the far side. Eighteen men and a sergeant guarded the Queen Street bridge over the Assunpink; and at a tavern near the Trenton ferry, a commissioned officer, five noncoms, and twenty-two privates spent most of their time dodging cannonballs, impertinently fired at them whenever they popped in sight by a Colonial battery perched on the high bank across the river. A fifth picket was established near Bordentown for no reason now known to history, since that bailiwick was entirely within the jurisdiction of Colonel von Donop.

Bursting with his new responsibilities as a brigade commander, Rall at first kept his entire garrison under arms day and night, and even sleeping in full equipment. But by the end of thirty-six hours his command was in such exhaustion that he compromised by appointing in rotation a "regiment of the day," one battalion of which was always to be ready for instant duty. Then he sat back and cheerfully exclaimed to his officers, "*Lasst sie nur kommen!*" (Now let 'em come!)

Rall's officers, however, were far from sharing his complacent outlook. They didn't question the defensive ability of their men. "Let 'em come" was all very well; but the German position was nevertheless entirely unfortified, and the terrain of the town and surrounding country was so open that some kind of fixed defenses were certainly indicated. To all pleas for such added protection Rall turned a jovially deaf ear. After all, the foe was nothing but a lot of rustic clowns of no military account, and as for breastworks, *Ach!* With broad Teuton humor he roared that the local female population could supply all that his officers needed. Then he turned to the more important problems of daily parades, formal guard-mounts, and inspections, with special band concerts at his quarters included. Christmas approached in the true festival spirit of a German Yuletide.

On the Pennsylvania side of the Delaware this Kris Kingle complex was noticeably absent. Scattered for some twenty miles along the bank, the soldiers of the Provincial Army shivered through their daily routine of drills and patrols, and of begging or buying old clothes and shoes from farmers to keep from freezing in their tracks. Few units had enough blankets or other camp equipment; there were no warm uniforms; and there is record of one infantry regiment completely barefoot in the winter snows.

Sensing the impracticability of longer remaining where he was, Washington determined to seize the offensive. He announced that he planned to cross the Delaware and carry the fight to the Hessians. He had learned of their unsound defensive measures and grimly remarked, "Now is our time to clip their wings while they are so widely spread!" With confidence and enthusiasm the other American generals approved, despite the enemy's obvious superiority. Divine Providence, moreover, was on the side of liberty; the plan could not fail. Fortunately, too, Divine Providence had a strong ally in the corporeal being of John Honeyman, Esq., purveyor of cattle to His Majesty's Forces.

Master Honeyman was a veteran of Wolfe's campaign at Quebec, and since then had retired to civil life in Griggstown, New Jersey. When the British came to Trenton he suddenly evinced strong Tory tendencies, and was roundly berated by friends and family alike for his scandalous trafficking with the hated Redcoats. The Redcoats, however, welcomed the fresh beef he supplied to them, and he was a favored visitor in their billets and outlying pickets. On the afternoon of December 22, Honeyman wandered into the country about three miles from Trenton, ostensibly to find more cattle to buy, and sud-

denly ran into a couple of Americans who had crossed the river on a scouting expedition. To say that he "ran into them" is inexact, perhaps. He saw them first but carelessly continued to crack his drover's whip, almost as if he were trying to attract attention. At any rate, that is what he succeeded in doing. The scouts rushed up, captured him, and whisked him over to Pennsylvania where they pridefully dumped him at Washington's feet. The General seemed pleased at the capture, and talked privately with the prisoner for half an hour. Honeyman was then placed in a log hut to await trial on the morrow. But when the morrow dawned the captive had disappeared. It was not till months later that he received due recognition as one of Washington's most trusted spies.

Fortified with the detailed information of the Hessian dispositions received from Honeyman, Washington now determined to cross to New Jersey and attack the enemy on the night of December 25. The final plan called for Cadwalader's division to get over the Delaware at Bordentown and engage von Donop's forces there. Ewing was to take his division over the Trenton Ferry and hold the Assunpink Creek and Bordentown Road against Rall's possible escape or against reinforcements from von Donop. Simultaneously, Washington would cross with 2,400 at McKonkey's Ferry some nine miles west of Trenton, and from there surprise the town itself. General Gates would remain near Bristol and lend his support when, as, and if, needed. The boats necessary for the movement were brought from their hiding places along the river. And as the sun began to sink over the snowy landscape on Christmas afternoon, the troops paraded before marching off to the rendezvous. Each file carried three days' ration and a supply of fresh flints.

Snow began to fall. Through it a horseman galloped up to Washington, about to leave his headquarters. It was the ill-starred Wilkinson bearing a letter, and Washington was not glad to see him.

"What a time is this to hand me letters," he exclaimed impatiently. "Who's it from?"

Wilkinson replied that General Gates had sent it. "He reports he is too ill for duty, sir."

"General Gates?" echoed the commander. "Isn't General Gates at his post? Where is he?"

"I left him this morning at Philadelphia," answered the unhappy messenger. "I—er—understood he was on his way to Congress."

For a moment Washington was stunned by this evidence of perfidy. He was fully aware of the envy and ill will Gates bore him. Thus he realized that Gates' only reason for going to Philadelphia was to persuade Congress to give him the supreme command. But there was no time now for personal worries. With no further word Washington crammed the letter in his pocket and ordered the embarkation to begin.

By now the weather was bitter cold and a wind drove stinging snow into the bowed faces of the men huddled on the thwarts of the boats, as the Marblehead fishermen of Colonel Glover's amphibious regiment rowed them into

the open river. The crossing was all that tradition has pictured it. The hitherto open Delaware was becoming choked with ice that bumped and ground around the laden craft as the rowers battled to head them through storm and slanting sleet to the landing place. Progress was tantalizing slow. But finally the advance detachment under General Stephens reached the east bank and established a guard around the beachhead.

Washington and Knox and a few staff officers then embarked for the perilous trip. As their boat began to feel the full storm and the black waves splashed icily over the gunwales, some spirits sank, as low, almost, as the very temperature. But Washington seemed oblivious to any danger to themselves or their enterprise. Halfway across he turned from his seat in the bow and called back to his portly chief of artillery, "Shift your tail, Knox, and trim the ship!" This unexpected raillery from their usually somber chief caused a general laugh and broke the tension, and the trip was completed without mishap.

All troops with Washington had crossed by three o'clock, and the artillery and horses were ferried over within an hour. During this trying period, Washington, wrapped in his great cape, stood by the river's edge or sat on a box issuing orders. A diarist in the ranks noted that his general's nose was very red from the cold and that "he was not what ladies would call a pretty man." Nearby stood Knox, his great voice relaying commands for the landing and forming of the troops.

By four o'clock the entire force was in line. Stephens' guards were called in to rejoin their brigade, and the advance began along the ferry road that led inland about a mile to the Bear Tavern. Here the column turned right along the River Road for three miles to the hamlet of Birmingham, in an eerie procession through the dark. As the troops marched, the storm wet the priming powder and flints of many of their firelocks, making them impossible to fire. General Sullivan reported the fact to his commander, and Washington's reply came with spirit: "Damn it, Sullivan; you've got bayonets, haven't you? Use them! Trenton has got to be taken and we're going to take it!" No one made further complaint.

Arrived at Birmingham, the army split into two divisions. Commanding the 1st Division was Major General Sullivan, with Brigadier General St. Clair and Colonels Glover and Sargent heading the brigades; and with the artillery batteries in charge of Captains Neil, Moulder, Hugg, and Sargent. This division continued along the River Road, which would bring it into the southern end of Trenton. Major General Greene headed the 2d Division, with brigades commanded by Brigadier Generals Stephens, Mercer, Lord Stirling, and de Fermoy; and with attached artillery composed of the batteries of Captains Forrest, Bamman, and Alexander Hamilton. General Washington, with the Philadelphia Light Horse as his headquarters troop, and with Knox close at hand, accompanied the 2d Division. The route of this division led straight ahead for a couple of miles, then bore to the right until it reached the Pennington Road which would take it southeast to

Trenton's northeast outskirts. Four guns headed each of the two leading brigades in each division, and two guns led each of the third or rear brigades.

Both columns moved silently through the sleety night. Orders had been given that any who talked or made unnecessary noise would be shot forthwith, but warnings were not needed. The schoolbook stories of the snow-covered trails red-printed by blood from the feet of barefoot and rag-shod men are true; but none complained aloud. All ranks were grim with desire to avenge their past defeats and kept always in mind the password for the day, "Victory or death!" No one saw them, no one heard them, as they passed. The snow muffled their tread and the accompanying rumble of artillery. Once a farm dog rushed out barking. A file closer stepped quickly out of line with bayonet lowered, and the march continued silently as before. But after a while, a single Tory farmer spied the marching columns, and raced toward Trenton.

But what, during all this time, was happening in that town? Exactly what Washington had thought would happen on Christmas Day to a community of expatriated Germans, homesick for the Fatherland and its traditional Yuletide merrymaking. The scattered houses of the village blazed with the light of lamps and candles, and resounded to the rousing choruses of German drinking songs. Through the frosted windows passersby could gaze on groups of rollicking soldiers gathered round the first Christmas trees to be seen in America. All day the officers and men held high wassail. The heady brews of their own country might be lacking, but native rum made an acceptable substitute. And so did a strange liquor distilled by neighboring farmers called "applejack," which combined potable excellence with potent effect in a most satisfactory manner. By nightfall the Hessian garrison's only thought of Americans was one of thankfulness for their invention of such an excellent tippie.

Indeed, it took the Americans themselves to remind the Hessians that a war was on, and this happened rather by accident than design. Towards eight o'clock of the evening Colonel Rall, after a perfunctory inspection of outlying pickets, was just sitting down to checkers in his headquarters when the sound of a shot brought him back to his feet and the checkerboard to the floor. Silence. Then a volley . . . a few scattering reports . . . and silence again. Rushing outside he found the town in an uproar. The Rall regiment, the "regiment of the day," was tumbling into ranks in King Street, and the thunder of the long roll beaten by von Lossberg and von Knyphausen drummers indicated that those regiments, too, were forming.

Leaping on his horse, the Colonel shouted for his men to follow him to the head of King Street whence the alarm had seemed to come, then galloped off. As he arrived at the junction of the Pennington and Brunswick Roads, a breathless courier from the Pennington picket made report that his post had suddenly been attacked by a party of Colonials who had wounded six of the guard.

The doughty commander laughed off a suggestion that an intensive and immediate reconnoissance of all roads

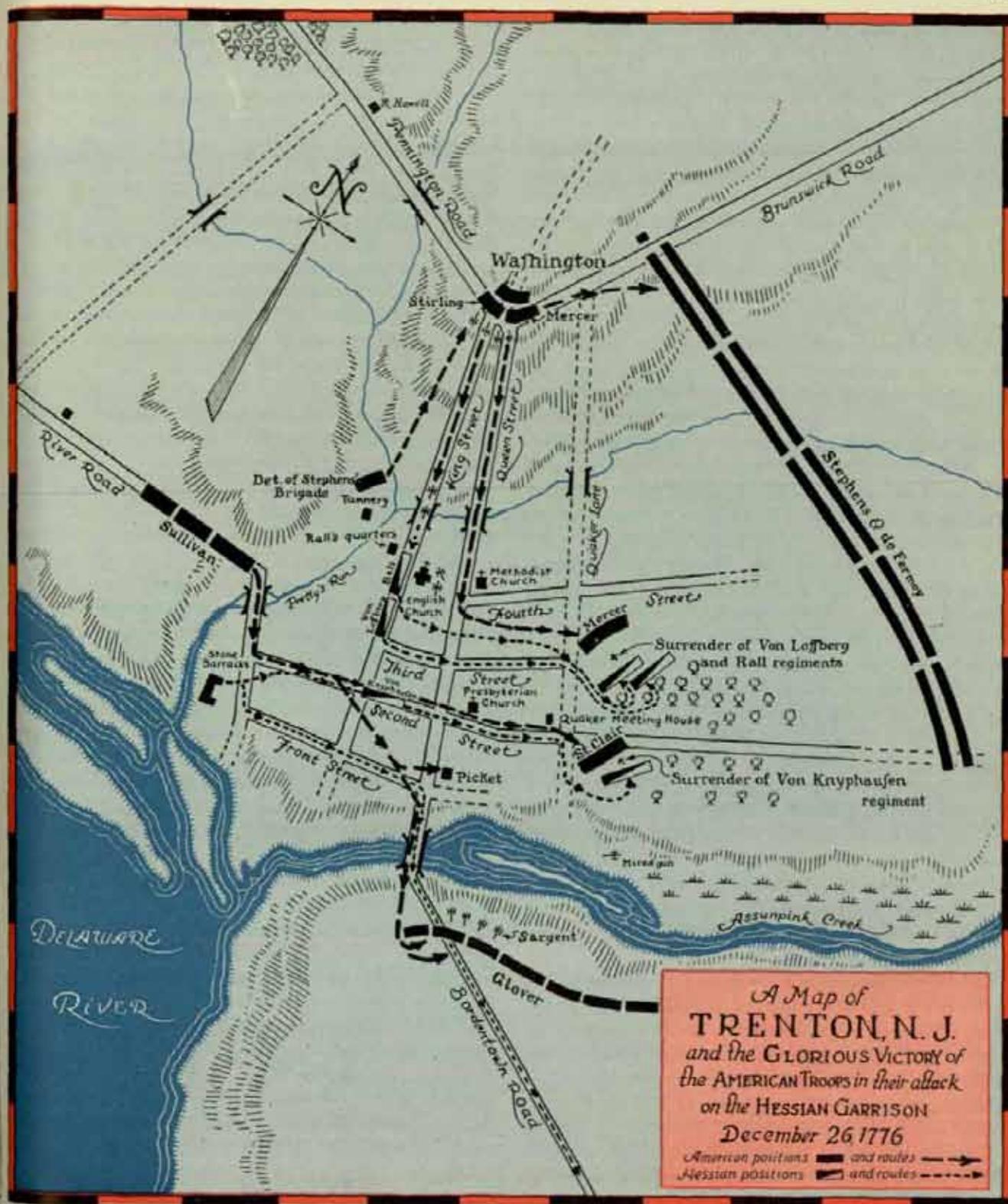
leading to the various Delaware ferries be undertaken. Undoubtedly, he assured his worried staff, the attack was only a foray by a roving party of farmers. No need to fear any further hostile demonstrations. Let everyone go to their quarters. In no time the soldiers resumed their revelry where it had been interrupted, and Rall himself hied to a convivial gathering at the home of Postmaster Hunt, a citizen of chameleon political coloring. Here he drank and dined in high good humor, and here, close on midnight, came the Tory farmer from Pennsylvania demanding instant audience.

This loyal subject of King George had stumbled as we know, upon the movement of the American troops. And if he had now succeeded in gaining access to the Hessian colonel, the whole course of American history might have been changed. But he didn't. The colored butler refused to let him break into the party; so he hastily scribbled a note to Rall apprising him of the events that were shaping themselves for his special concern. And then he walked off into historical oblivion. The note was brought to Rall, but the dice were rolling well for him at the moment, and he stuffed the paper in his pocket without looking at it. Poor Rall! That evening's gaming was to cost him stakes of far greater value than the gold pieces piled on the cloth before him.

By four in the morning stupor and sleep had silenced the roistering garrison, and as Rall weaved home to bed, the quiet of the snow-filled night was broken only by the jingle of harness chains and the pawing of the gun horses as they waited on King Street to make the early morning artillery patrol to Trenton ferry and back. The lieutenant in charge reported to the officer of the day for any special orders, and we can imagine his gratified surprise when he was told the patrol would be omitted for that morning. He would have been even more startled had he known there would never be any more such patrols, and that in twenty-four hours the officer of the day would be beyond caring whether they were held.

Long before all of this, however, the American "farmers" who had skirmished with the Pennington picket were hastening back to McConkey's Ferry. They were, in fact, a scouting party of Stephens' brigade, quite unaware of the preparations for an attack that had begun since they left their Pennsylvania camp that morning. By the time they arrived at the river they found their own outfit guarding the debarkation. There was only time for a cursory report of their escapade before the advance on Trenton began.

Just as a surly dawn was lighting the landscape, Washington and the 2d Division emerged from the woods bordering the Pennington road and sighted the white roofs of Trenton dimly highlighting the gray horizon ahead of them. Twisting around in his saddle, the General pointed exultingly. "There they are!" he shouted. "Press on, lads, and remember what you're fighting for!" But almost at once he reined in, at the sight of a man standing by the roadside and giving every indication of being about to flee like a startled rabbit. "Halt there!" Washington com-



Map 3

manded. "Where's the Hessian picket?" He could not have addressed himself to a better source of information, for the man was Richard Howell who owned the house the picket had preëmpted. As Howell hesitated, apparently suspicious of his questioner, Captain Forrest rode up and reassured him. "Speak up. We're not the British. That's General Washington." The man's face broke into a smile. "God bless you, sir," he replied with fervor.

"There's the picket, right there," pointing to a house two hundred yards away.

At almost the same instant the sentries on post saw the Americans. "Heraus! Heraus!" they shouted. "Der Feind! Der Feind!" The rest of the guard came stumbling out of doors as the Americans began firing and deploying on each side of the road. But the Hessians held their fire momentarily. Apparently they thought they had only to

deal with the same small detachment that had disturbed them earlier in the evening, and decided that they would wait, this time, until they could be sure of silencing them permanently. When they realized their error, they had only time enough left to fire a hurried volley and withdraw in as good order as possible across the fields towards Rall's headquarters. The whooping cohorts of Mercer and Stephens added impetus to their retirement and drove them back on the town so relentlessly that they were unable to form for any show of real resistance.

Hearing the row, a party from the Brunswick road picket came racing to help the Pennington outpost, arriving at the head of King Street just in time to be swept back again by the force of their comrades' retreat. Coincidentally, another relief party was hurrying across lots from the River Road picket. It had gone but a little way when the rattle of musketry in their rear caused the men to turn and, horror-struck, see Sullivan's column advancing along the road they had just left, driving the rest of their guard before it. Wheeling around, they were able to rejoin their command in its flight to the stone barracks on Front Street; and there they halted long enough to fire a volley at the charging enemy. But the Americans were not to be stayed, and the Hessians broke and ran for Queen Street and the bridge over the Assunpink, followed by the British dragoons.

Meanwhile, the rest of the pickets had been dislodged from the Pennington and Brunswick Roads and were falling back along King Street, leaving the Americans in command of the high ground at the road junction north of the town. The remainder of the German garrison was by this time aroused and was falling in as rapidly as possible; but Colonel Rall had not as yet put in an appearance, or issued any orders. Frantic, his adjutant pounded on the door of his quarters, and eventually the tousled head of his chief appeared at an upstairs window.

"*Vas ist los?*" he muttered thickly.

"*Gott im Himmel!*" shrieked the adjutant. "Don't you hear the firing, Colonel?"

The colonel listened and his florid face blanched. "I'll be down at once," he replied; and buckling his sword belt about his hastily donned uniform, he lurched from the house as American bullets came whistling from the head of the street.

Having cleared the Pennington and Brunswick Roads of the hostile guards, Washington now sends de Fermoy and Stephens ahead to throw their brigades in a double line from the Brunswick road to Assunpink (Map 3). There will be no escape for the Hessians in *that* direction. At the head of King Street he places Stirling's brigade; Queen Street he gives to Mercer. Roaring like a bull, Knox directs Forrest's guns to support Mercer, and Hamilton and Bamman to join Stirling. The guns come up at the gallop and slew around into battery, and their opening salvo adds to the Hessian confusion. The exact location of those guns is marked today by the Trenton Battle Monument. Standing there and looking down to the town as Washington must have looked at it from the

same eminence, it is easy to appreciate the General's feeling that at last Fate had delivered his enemies into his hands in no mean fashion.

King Street, dimly seen through the driving hail and snow, is a welter of milling men. Excited officers strive mightily with full-bodied German oaths to whip their confused commands into some sort of formation. Before Rall's house, cannoneers battle with plunging artillery horses as they try to hitch them to the gun carriages. Rall, swaying dizzily in his saddle, whips out his sword and orders forward his own regiment. They go but a few steps when a part of Stephens' brigade reaches a tannery west of King Street, and from behind its fence enfilades them with a fire that rocks them back on their heels. Into their front ranks plunge the last of the Pennington Road guards to escape the Americans, and Rall bellows exhortations to push the cannon ahead. The two guns rattle off, but have gone scarce a hundred and fifty yards when Hamilton, his hat characteristically jammed down over his sharp black eyes, spots them. His brass three-pounders flash and roar, and flash and roar again. Two horses on one of the Hessian guns and three on the other go down screaming and thrashing in the snow; eight men of the gun crews lie among them, dead or wounded. With the strength of desperation the survivors somehow get the cannon free of the mess, and fire six shots from each piece at the foe. By this time only a lieutenant and one gunner are still on their feet; they call for help but it doesn't come. They load and fire one last round of grapeshot and leave the guns to their fate.

The von Lossberg regiment has been mustered in the yard of the English Church and now comes into King Street at the double. Instantly it tangles with the retreating Rall regiment, in which most of the field officers are already casualties. The resulting confusion is worse confounded by the rifle and cannon fire that pours into it. It is too much; the excellent Hessian discipline breaks, and the Rall grenadiers run down the street and across the church yard seeking the sanctuary of escape over the Assunpink. They leave their colors behind, but the von Lossbergs rescue them, then wheel to their right to try to stem the American tide that is beginning to filter down Queen Street.

Washington sees the Rall guns deserted on King Street and nods at Stirling. "Charge them!" yells the brigadier, and a regiment bounds forward. A von Lossberg rifleman shoots Captain William Washington through both hands and another ball cuts an artery in the neck of Lieutenant James Monroe, but the guns are captured and the wounded officers remain on the field. The von Lossberg regiment maintains its formation and starts to move in the direction of Queen Street as the von Knyphausen men leave their quarters at the corner of Queen and Second. Rall is with them now, bitterly bewildered at the broken remnants of his own unit streaming past. A bullet grazes the side of his head, and although he bleeds profusely, he protests that he is all right and disdains assistance.



"Hamilton's three-pounders roar and flash."

Sensing the new danger at the head of Queen Street, the Hessian leader orders two of the von Knyphausen cannon into action to stay the American advance. Eight rounds are fired before Forrest's battery puts one gun out of action. Another shot kills three of the German horses and a gun captain. As his own horse falls beneath him, the battery commander orders a withdrawal, and the survivors join what is left of the Rall and von Lossberg regiments as they move off into the orchard east of Queen Street. When Mercer's men come yelling down the road they are unopposed.

The von Knyphausen column has already started along Second Street and gets as far as King when it runs head-on into Sullivan's division entering the town at the south. Moulder's battery goes into action, and the narrow thoroughfare is filled with the tumult and riot of a hand-to-hand struggle in which no one asks or gives quarter. Slipping and sliding, the Hessians are slowly driven back. They are brave men and they fight and die bravely. But when they see another Continental force bearing down King Street on their right, their retreat becomes flight.

Leaving a part of his division to follow up this advantage, Sullivan whips over to Front Street and the Assunpink bridge. He is too late to intercept all of the fugitives, but he dislodges the picket near the ferry and sends Glover's brigade with Sargent's artillery to occupy the high ground on the south side of the creek.

Rall, unwilling to admit the possibility of further retirement, decides to counterattack and orders his conglomerate command back towards Queen Street. "Use the bayonet!" As he spurs forward, the men start to follow in good order. But the American fire is now closer and more destructive, and again they falter. Rank and file are dropping on all sides; guns and accoutrements fall in the slush, and the proud brass hats roll under foot as

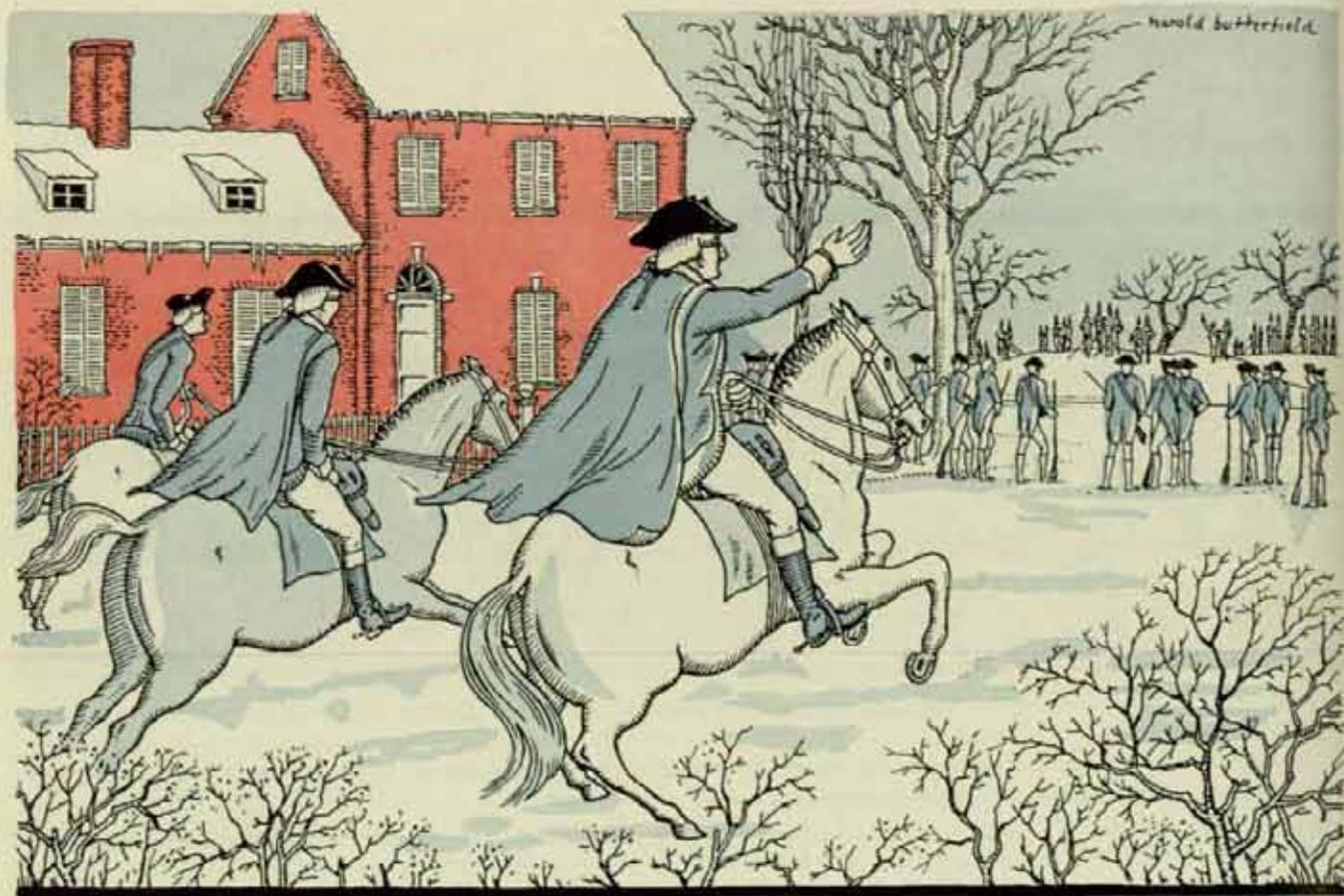
the lines dissolve on the sodden snow, retching themselves into immobility.

The colonel stands in his stirrups and swings his sword. He is weak from loss of blood and his voice is hoarse from yelling, but he can still make one last appeal.

"*Alle was meine Grenadiere sind, vorwärts!*" he shouts. "*Vorwärts!*"

But all his grenadiers who are still alive are too broken to obey. They gaze stolidly at him with lack-luster eyes and sagging mouths. It is beyond their comprehension and ability to go forward. Rall rides ahead, and two lead slugs tear into his side. Belly wounds hurt, and his iron spirit gives way. He slips all in a heap from his horse's back to the ground. After a moment two privates bear him to the Methodist Church, the garrison hospital. As they lay him on a bench a folded paper drops from his waistcoat pocket. "For you, *Herr Oberst*," says an orderly handing it to him. Rall takes it, glances quickly at it, and his face grows even whiter. "*Ach, Gott*," he groans, "if I had read this last night I would not be here now." It is the warning of Washington's attack from the Tory farmer.

The von Lossberg and Rall grenadiers are now wavering, despite the efforts of their hands which have been ordered to play them into action with the regimental quicksteps. Every house seems to shelter American riflemen, and windows are now lit by gleams far different from those that shone from the Christmas trees at nightfall. The heavy white smoke of powder hugs the ground in a fog; it billows among the sheets of driving hail, and winds like a great shroud around the distracted Germans. They retrace their steps to the orchard, and like sheep driven by a storm, they huddle together while their three surviving field officers hold hurried council. In front of them, behind them, and on both flanks, the Continentals are closing in: the encircling bayonets and firelocks and



"It is a great moment for the American command."

cannon are not more than twenty yards away. A Hessian lieutenant colonel calls out to the American line that his men will have to surrender. The proud German standards swing down, rifles are grounded, and on the points of their swords the Hessian officers raise their hats in token of final submission.

An aide spurs up Queen Street to take the good news to Washington and meets him, ignorant of this latest development, just as he is about to order a salvo of canister to bring matters to a conclusion. Waving his hat, the aide cries, "Wait, sir, wait! They have struck!"

"Struck?" asks the commander.

"Yes, sir!" says the other. "Their colors are down!"

The general peers through the mist. "So they are!" he agrees joyfully, and sends his horse flying to the scene, with Forrest and the others pounding along behind him. It is a great moment for the American command, to be made even more satisfactory in a few minutes when the von Knyphausen regiment also throws down its arms.

Beaten back along Second Street, the von Knyphausens sought refuge in the swampy ground by the Assunpink, hoping to evade the observation of Glover's artillery across the creek, and perhaps get to safety around the left flanks of de Fermoy's and Stephens' brigades. But two of their cannon became mired, and before they could extricate them, word arrived that the other regiments had capitulated.

At this bad news, the major in command summoned a

junior captain and directed him to inform the other officers that surrender was imminent. To this the captain made bold to object; they were still unseen by the enemy and there was yet time to try to ford the creek. Badly wounded, the major was in no mood to bandy words with a subordinate. "Verdammt!" he raged at the junior. "It is an order, captain. Do as you are told!" The captain slunk off on his errand, and the major, sure he had enough fighting for one day, stuck a white handkerchief on a bayonet, and with a corporal to assist him, sought the American line.

The action disclosed the position of the hidden von Knyphausens, and St. Clair's brigade was down on them like hungry wolves. "Come out of that," yelled St. Clair, "or I'll blow you to pieces. Surrender immediately." A volley gave force to his remarks. The Hessian captain upon whom the command had devolved rode sadly forward and delivered up his sword.

The Battle of Trenton was over.

What matter that Gates had failed in his duty, or that the ice had kept Ewing and Cadwalader from getting across the river? With casualties of only two officers and two privates wounded, the Americans had forced and won the first major offensive action of the Revolution, capturing 6 guns, 15 colors, 868 Hessians, and killing and wounding 106.

The next morning Washington visited the wounded Rall as he lay in his quarters. The German was dying

and knew it, and his last agonies were accented by the realization that his own obstinacy had played a large part in the defeat of his forces. But the flame of his spirit still burned, though dimly; and he struggled to raise himself to attention when the tall form of his conqueror bent over him and compassionately pressed his hand.

"Ah, Excellency," he murmured, "for myself, I ask nothing. But my poor men—you will be kind to them? They are good men, truly, and they are so far from home—so very far from home." As Washington bowed his promise and withdrew, Rall sank back exhausted but smiling; he would never see the Fatherland again. But his men would—if he could only go with them—but perhaps this way was best if the good God willed it so.

They buried him in an unmarked grave in the Presby-

terian Church yard, and a legend still persists that a secret passage leads from the old church basement to his vault.

A Hessian lieutenant wrote an epitaph for his departed chief:

*Hier liegt der Oberst Rall
Mitt ihm ist alles all!*

It was never placed above him, but it bore a curiously prophetic application to the cause for which Rall died in defeat. From Trenton on through the remaining years of the Revolution, all was increasingly over for the King's men.

In the nation which the Battle of Trenton helped so materially to give us, there are today those who doubt the existence of a Santa Claus; but certainly there was one in 1776, and his alias was George Washington.



"Filled with the tumult of a hand-to-hand struggle."

Training AA Searchlight Spotters

By Captain L. E. C. M. Perowne, Royal Engineers

INTRODUCTORY

Technical progress in the past few years has been kind to the antiaircraft searchlight detachment.¹ No longer are the sledgehammer, jumping bar and dolly necessary and unhandy accessories to erection. The searchlight operator

now strikes his arc by the closing of a switch, and the semi-automatic H.C.D. lamp reduces his labors in maintaining a proper light to a mere fraction of those required of his predecessor who struggled with feed screw and Yorke control. Your engine-driver, too, no longer fiddles caressingly with his throttle control, waiting to nurse his machine through the crisis of arc-striking, for the sudden efficient "clank" of

the solenoid governor now relieves him of all anxiety in this connection. The listeners, or at any rate some of them, will shortly repose in comfort on the sprung saddle-seats of the Mark VIII locator and there listen luxuriously to the finer limits of accuracy rendered possible by the paraboloid collectors of this modern instrument. Your ring-sight number, even, is about to be released from the tyranny of the knuckle-joint by that masterpiece of ingenuity, the course-finding sight.

But this tide of technical advancement in antiaircraft searchlights has passed the spotters by. It has, indeed, in rising, immersed them in some respects farther than before in that sea of difficulties in which they flounder to achieve their objective. For, while the range of the beams has increased, and consequently, the heights at which targets are engaged, the beam itself has grown smaller; so that your spotters are left, clinging manfully to their "Heath Robinson" chairs and clutching their binoculars, to cope as best they can with increased difficulties without any fundamentally improved equipment.

Yet these spotters are, perhaps, those members of the detachment who are required to contribute more than any others to the final act of illuminating the target, which is the principal objective of the whole.

THE SPOTTER'S RÔLE

The inaccuracies inherent in the sound locator² and in the method of its use impose upon the process of picking up a target by sound alone an incertitude which furnishes the chief reason for the spotter's existence in the detachment. Consider a detachment engaging a "heard" target

¹The searchlight detachment is composed of an NCO and eight men, whose duties are as follows: Nos. 1 and 3, spotters; No. 2, engine-driver; No. 4, projector controller; No. 5, searchlight operator; No. 6, ring-sight number; Nos. 7 and 8, listeners.

²Reference is to the sound locator Mk. IIIx.

(T, Fig. 1). For the purpose of this investigation we may assume 1st-Class listeners and a fully-trained Sighting Number. Each of the listeners may have an average error of 3 degrees in either direction. At any instant during the engagement, therefore, the target lies at the center of a

"Square of Error" each side of which subtends an angle of 6 degrees. Ignoring ring-sight errors (which may be considerable) we assume the beam brought within this "Square of Error." Taking the beam (B) as of divergence $1\frac{3}{4}$ degrees, the chances are of the order of 15 to 1 against being on target by sound alone. But the spotter, searching in the vicinity of the ap-

parent end of the beam with binoculars, has the whole of the "Square of Error" within the field of his view, and it is probable that the stray light from the beam extends sufficiently far to reduce the chances against him detecting the target to the order of 3 or 4 to 1. Thus with four or five beams searching simultaneously, the odds are on the target being picked up. It is important to understand that this is the reason for detailing one of the spotters to watch his own beam, and that when doing so he should make use of his binoculars.

An approaching target, however, presents to those at the searchlight station (A) (Fig. 2) an aspect so weak as to frequently render it impossible of detection by the momentary illuminations of their own beam. But, at a distant or flanking station (B), the same target appears strong in aspect and presents a considerable undersurface from which light is reflected, with the result that the spotter there, charged with the duty of watching neighboring beams, is enabled to direct his own beam on to the aircraft. Thus we learn the need for the second spotter in the detachment. It is important here to appreciate that, during the actual engagement, this spotter is watching other beams for the target being engaged and not, as is so often supposed, for fresh targets;³ and that, as he will have to watch simultaneously up to five beams actively searching for the aircraft, the field to be covered is too wide for binoculars, so that he does so with the naked eye.

Occasions are not infrequent in action when a target, though itself in darkness, appears momentarily in silhou-

³This misunderstanding is widespread and probably accounts to a great extent for the number of unobserved "flick-overs" annually reported by the pilots of cooperating aircraft. For while No. 1 (say) studies the vicinity of his own beam in the limited field of his binoculars and is there presented with targets weak in aspect, No. 3 is so often wrongly engaged in watching for fresh targets and is therefore not looking in the direction of the aircraft being engaged, so there is no one to detect the "flick-over."

**A spotter requires
keen intelligence
and a knowledge
of air-raid tactics**

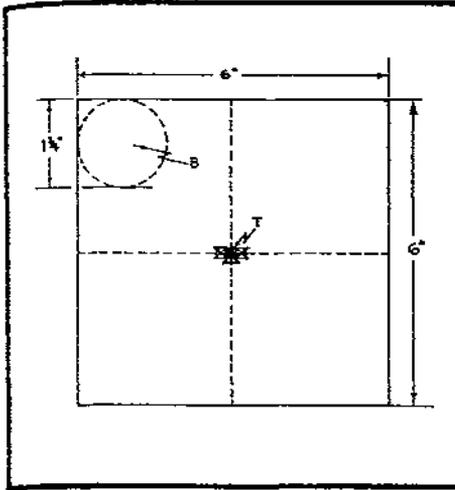


Figure 1: Square of Error

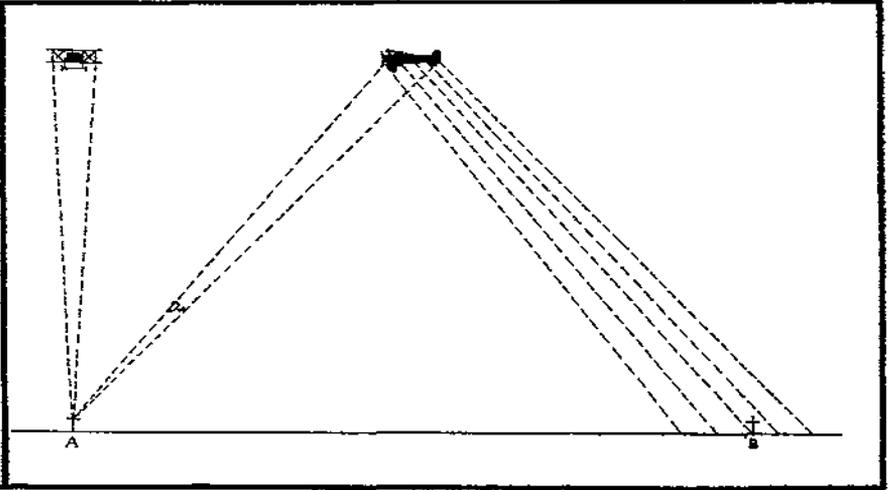


Figure 2: Target Aspect

ette before a distant searchlight, or in the path of the moon, thus offering to the spotter a further opportunity of illuminating it with his own beam. The experienced spotter will also find opportunities for unaided detection and location, especially when meteorological conditions are favorable and the target appears as a black silhouette against the lighter sky. In the case of gliding attacks, when the aircraft's engines are throttled back, the acute spotter, by the observation of exhaust flashes and other manifestations, furnishes the detachment with its sole chance of illuminating the raider. Finally, in conditions of poor visibility the projector controller may have to rely entirely for his directions in taking over and following an already illuminated target on the spotter, who, being situated farther from the glare of the searchlight, is better placed to see the target and to control the beam.

The duties of the spotter may be summarized approximately as follows:

1. To *locate* the target with or without his binoculars either (a) in his own beam, (b) in other beams, or (c) entirely unilluminated.
2. To *direct* the beam with the greatest possible speed on to the target as soon as he sees it and to continue giving directions so as to keep the beam on the target until the projector controller sees it.
3. To *warn* the detachment commander of the presence of new targets.

It is clearly of the highest importance that the spotters, who are required to work independently from their isolated posts, should be keenly aware of what is expected of each of them at every stage of the engagement.

A more detailed analysis of their duties is, therefore, necessary if the essential coöperation within the detachment is to be assured.

We have already considered their action during the normal engagement of a target by sound. Assume now that the target is actually seen by one of them. He is required to direct the beam on to the target as quickly as possible. This he will do by means of the conventional

orders and using his binoculars or not as circumstances dictate. The action of the second spotter is now a matter for consideration. If he has been engaged in watching other beams for the target, there is obviously no object in continuing to do so now that the target has actually been seen by his opposite number. In the case, then, of either spotter seeing the target, he occupies, for the time being, the position of the ring-sight number during the engagement to sound and, following the principle of "backing-up," the second spotter should now take the place of the man watching his own beam, using binoculars, and striving to detect the target in the stray light when the directing number shall have brought the beam close enough; and ready to take on from him at the first signs of hesitation or faulty direction.

When the beam is finally on the target, and the target is seen by the projector controller, this man accepts responsibility for it by shouting "On target," but the duties of the spotters are not then at an end. One of them (generally he who directed the beam, and in case of doubt No. 1) follows the target with his binoculars, "backing-up" the projector controller, and ready to assist him with directions should the latter show signs of losing the target. The second spotter is now spare and devotes his attention to the possibility of the approach of further targets, with a view to warning the detachment commander of their presence. In doing so he must study the behavior of other beams in all directions, both with the objects of noting the direction of flight of other targets already illuminated and of observing suspicious concentrations of lights searching to sound. He must also contemplate the presence of targets not at the moment being engaged at all, either by reason of all the lights being already occupied, or an account of the noise of the target in hand masking higher attacks. On account of the wide areas to be observed, the binoculars are not used. This phase in the spotter's performance clearly demands not only a keen intelligence but some knowledge of the tactics of air-raiding.

The rôles of each of the spotters in a detachment during the three stages of an engagement are shown diagram-

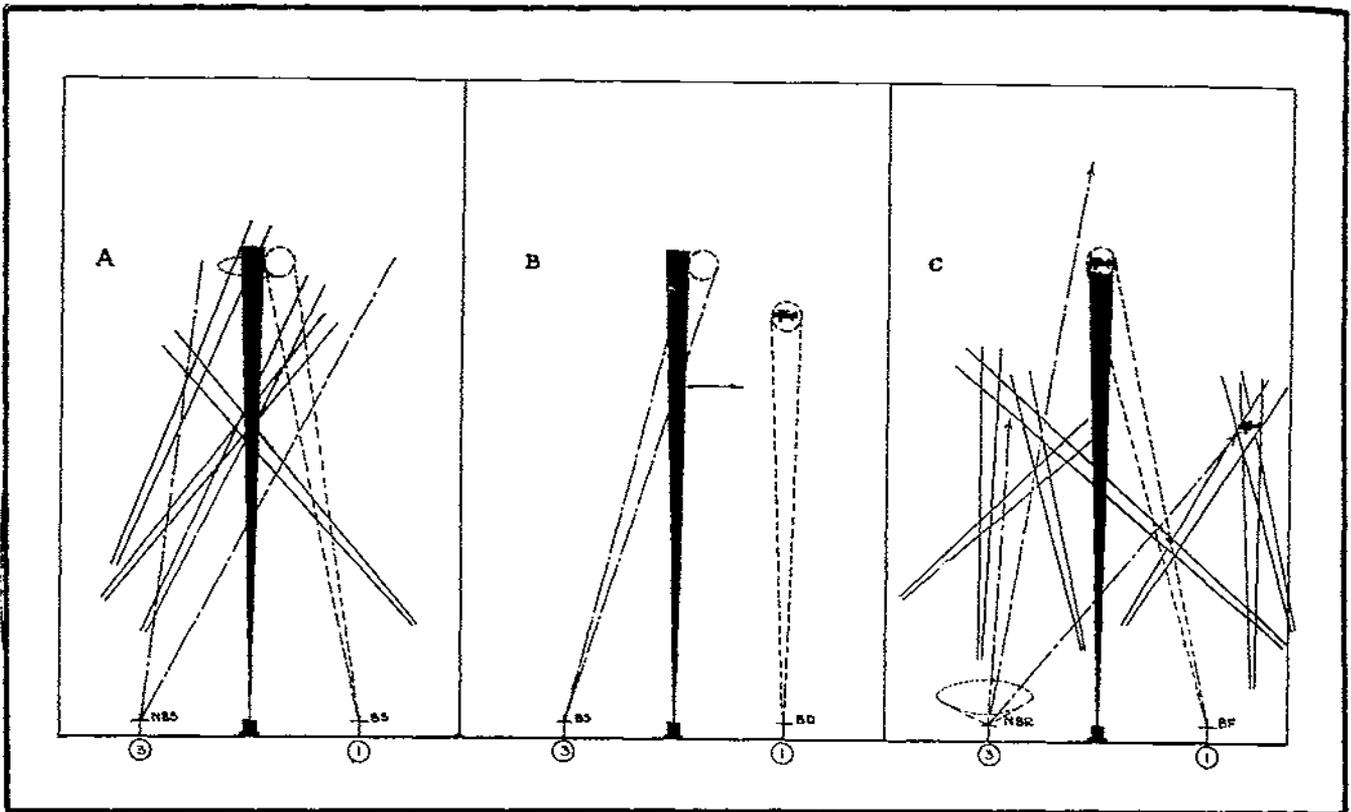


Figure 3

A. On Sound

B. Target Seen

C. On Target

matically in Fig. 3 and should be carefully studied by those responsible for detachment training.

SELECTING SPOTTERS

It will be seen that the proper working of the detachment in action is very largely dependent upon the efficiency of its spotters, and it will be evident that among the characteristics most required in men selected for these duties are keen intelligence, good hearing and eyesight, instant reaction and the power to command the movements of another at a distance by word of mouth alone. In practice, however, a variety of circumstances frequently combine to fill the spotters' ranks with men exhibiting few, if any, of the desired characteristics.

None with experience will deny the fact that the testing and selection of men as spotters is, both in Regular and Territorial Army [National Guard] units, the exception rather than the rule, with the result that those ultimately allocated to these posts in the detachment tend to find themselves there largely by process of elimination. In much of the preliminary training, nevertheless, it is convenient to group spotters, listeners, and the projector controllers, and it should then be remembered that it is more difficult to produce a good spotter than a good listener, and that the projector controller probably requires the least intelligence and training of all. Greater care should therefore be taken to ensure that the final allocation is such that men with inferior qualifications are not employed as spotters when with training they could classify

adequately as listeners, or become proficient projector controllers.

If anything, the spotter requires a more acute hearing than the listener because he will have to work with the unaided ear, and, whereas neither spotter nor listener can operate efficiently with unbalanced hearing (i.e., with partial deafness of one ear), the work of the projector controller and sighting number is not affected to the same extent by such an affliction. Perfect eyesight, on the other hand, is of greater importance to the spotter and to the projector controller than to the listener (who could be totally blind, and probably operate more efficiently for it) or sighting number. The spotter, therefore, requires both the most acute hearing and the finest eyesight in the detachment, though certain defects in vision are permissible to him, in the identification of which the assistance of the medical officer must be sought. In the modern conditions of living and working in the cities many people seldom see anything so far distant as 70 yards, with the result that their eyes tend to take up a permanent accommodation for short ranges (*Myopia*—short sight). Among older men especially, a flattening of the eyeballs resulting in long sight (*Presbytism* or *Hypermetropia*) is common. Both short and long sight, however, are subject to perfect rectification by the use of suitable glasses, and binoculars can be used effectively by men suffering from these afflictions without the use of their spectacles, the necessary adjustment being made automatically in the process of focusing. Astigmatism, which arises from an unequal

curvature of the vertical and horizontal sections of the cornea, may also be rectified, but only by the employment of a cylindrical lens, so that binoculars cannot be employed without the glasses and men with this affection of the eye, as well as those suffering from squint (*Strabismus*), work with the binoculars at the disadvantage of a field of view reduced by approximately one-quarter and should not, if it can be avoided, be employed as spotters.

Certain eye diseases debar a man absolutely from employment as a spotter. Of these, one of the worst eye scourges in this country is oscillating or "trembling" of the eyes (*Nystagmus*) which is very common among miners. Night-blindness, or the lack of the power of "dark adaptation," is also inherent in many people. Double, or even treble, vision (*Diplopy* or *Triplopy*) is present in a few in an insufficient degree to warrant refusal of admission to the Service, but a man suffering this disability is clearly inadmissible as a spotter. Color-blindness (*Achromotopsy* or *Daltonism*), on the other hand, renders us incapable of distinguishing tone, or at any rate certain tones, but not contrast, and would not seem therefore to be a very grave handicap to the spotter.

If, then, circumstances generally deny us the selection of spotters with those characteristics we most require, we must at least insure that no man is allocated to that post with an impediment in his speech or suffering from afflictions of the ear or sight which preclude the possibility of him ever becoming proficient at his duty.

TRAINING THE SPOTTER

The training of the spotter falls naturally into two stages, (a) Initial training of the recruit spotter, and (b) Exercising of the trained spotter.

The initial training of the recruit spotter is arranged with a view to teaching him the care and correct use of his equipment, the development of his natural faculties, and perfection in his drill actions, so that he may be ready instantly and efficiently to carry out his duties in the adverse circumstances prevailing when the AA searchlight detachment is called direct from sleep into action. It should, therefore, be carried through with the following aims:

1. To acquaint the man with his *rôle* in the detachment and make him aware of the difficulties with which he will have to contend.
2. By constant practice so to perfect his *drill* that his performance when the detachment is in action is at once stereotyped and spontaneous.
3. To teach him the most advantageous use of his *chair* and to orient himself by night so as to be able instantly to face a given direction, or to state what point of the compass he is facing.
4. To train him in locating a source of sound with the unaided *ear*.
5. To quicken the *eye and brain* to react instantly to the sight of a target under varying conditions of atmosphere and illumination.

6. To teach him the care and efficient use of his *binoculars*.
7. To train him confidently to control the movements of another at a distance, by voice alone, so as to be able to bring a beam on to a target in the shortest possible time. This will involve making him word and tone perfect in the regulation *directional orders* and developing the voice so that he can give them intelligibly over the 50 yards which separate him in action from the projector controller.
8. To develop in the spotter a high degree of *mental alertness* and a standard of physical fitness sufficient to ensure that he does not reach his post in action out of breath and unable to use his binoculars steadily.

This initial course includes a number of lessons which, once learned, need never be repeated. It involves also the learning of a number of quite independent processes, physical and mental, which pursue each other in natural sequence as the spotter carries out his rôle during the engagement. Thus our first requirement is to face roughly in the right direction, then to locate the source of sound, predicting the position of the target to within the required limits. When this has been done we have the process of detecting the target itself in the momentary or partial illumination of a beam. If using binoculars, this involves the mechanical process of focusing, the physical action of scrutinizing the field of view, and the mental processes of perceiving that an object is under observation and of appreciating whether or not this object is the aircraft. Finally, we must direct the beam on to the target.

Training subsequent to the initial recruits' course will consist principally in the exercising of the trained spotter in these processes to ensure the maintenance of the required standards. For this purpose they may be conveniently grouped as follows:

- Group I—Orientation.
- Group II—Location and Detection.
- Group III—Forms and Scrutiny.
- Group IV—Directing.
- Group V—Mental and Physical.

These groups will now be examined in detail with a view to defining the requirements in training called for by each of them. The additional matter included in the syllabus for the initial training of the recruit spotter, where this is not common knowledge, is to be found in the appropriate sections of the manuals or has been referred to above.

ORIENTATION

There are two independent operations under this heading, viz.: Reporting and Orienting. It is not necessary to emphasize the importance of a spotter, detecting the presence of a target, being able to report instantly and accurately its direction to the detachment commander. The spotters must also (in common with the remainder of the detachment) be able to orient themselves accurately and

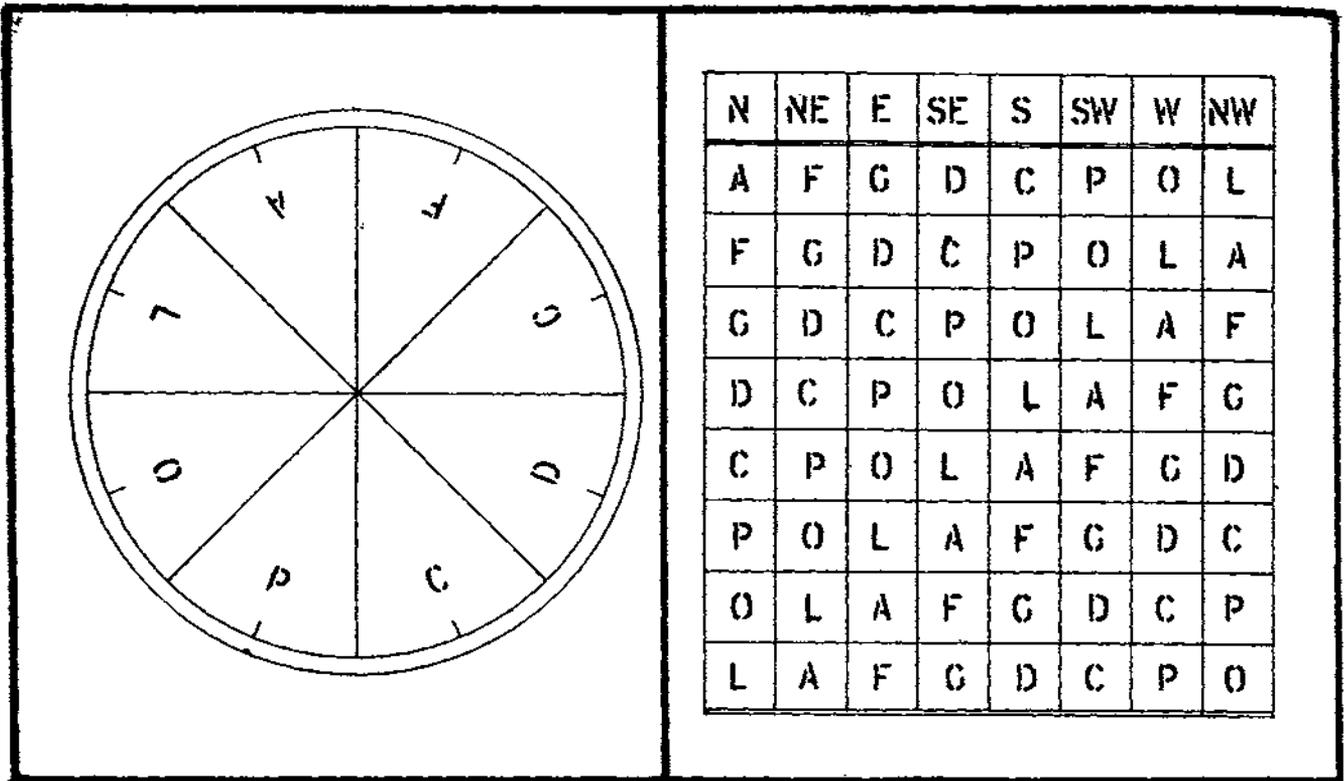


Figure 4

Orientation Disc shows arrangement of letters

Instructor's Key

instantly in the direction detailed by the detachment commander in his order to engage. The accuracy demanded in both these operations is not great and is defined by the drill as to half-cardinal (quadrantal) points. Orientation by night is easily lost, more especially after rotation once or twice in the spotter's chair in the course of an engagement, so reference marks are necessary on which the spotter can check his orientation. These consist of (a) one leg of the chair painted white; (b) conspicuous trees, houses, etc., or the projector itself; and (c) the Pole Star. Speed is an important element in all antiaircraft work and is as important in orientation as in any other duty in action. The spotter, therefore, will be required to be able to recognize the Pole Star, to know his points of the compass, and to report a direction in which he may find himself facing, as well as to face a direction ordered in the minimum of time, using any of a variety of reference marks as a guide. Let the spotter be placed in a spotting chair, centered over a disc marked off with the points of the compass in such a manner that they can be seen by the instructor and not by the man. Let a reference mark be detailed, and its supposed direction. Indoors this mark may be the door, window, or fireplace of the classroom. Out of doors, trees, houses, or, if by night, the Pole Star. Let the chair now be given a slight push by the instructor so that the spotter is swung through an unknown angle of bearing. When the chair comes to rest the spotter is given (say) three seconds to report to the nearest half-cardinal point the direction he is facing. Then let the instructor order an imaginary engagement in any direction

at random. The spotter now orients himself and his chair in the new direction and declares "on" within (say) five seconds of the order being given. The instructor checks the direction by reference to the disc beneath the chair. In this manner a class of eight or ten men can be exercised in the two processes of orientation in about five minutes. A different reference mark and bearing should be used for each man in the class, thus keeping the men's brains active, since none will know his orientation until he is actually seated in the chair. For this purpose it will be convenient not to have the points of the compass actually lettered on the floor-disc, or to have them lettered at random, the instructor being provided with a key previously related to the various reference marks. (See Fig. 4).

LOCATION AND DETECTION

The spotter works under the disadvantage common to all elements of air defense in that the only probable manifestation of an aircraft's presence by night lies in its sound. When explaining the sound-locator we habitually refer to man's directional sense of hearing as being liable to errors of the order of five degrees, and we are at pains to show that such errors are sufficient to negative any attempt to direct by unaided hearing a beam of only $1\frac{3}{4}$ degrees divergence on to a target. But these errors are well within the field of view of all the service binoculars (the smallest of which is 7 degrees) and, of course, amply embraced by man's normal unrestricted field of vision, so that the first requirement of the spotter, whether carrying out an independent search with the binoculars, or watching with the

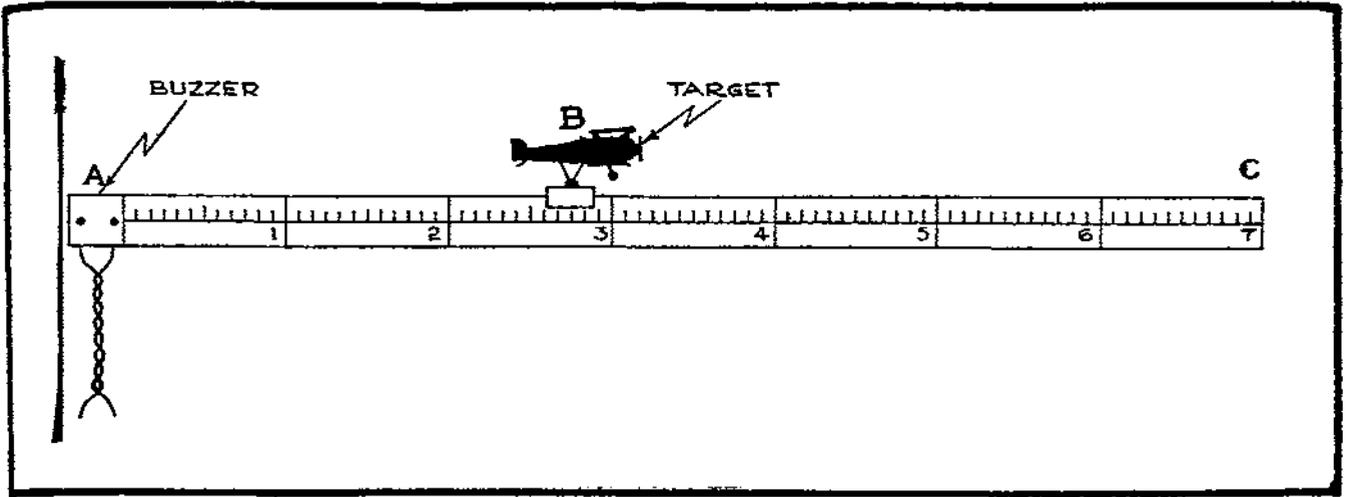


Figure 5: Prediction Target

naked eye for a "flick-over," is to direct his gaze as accurately as possible by sound. In all this work it is important to regard the spotter and his chair as a single unit where movements in azimuth are concerned, so that, with the man looking straight to his front, his line of sight, line of sound, and the longer axis of the chair are coincident. With the spotter's chair centered over a circle marked in degrees,⁴ and used as an azimuth locator in conjunction with a buzzer, the man should be taught to appreciate the "crossing-point" and thence advanced by the normal sequence of the Listeners' Course (Part I Instructional Practices) until he can carry out his "Three Swings Rapid" (Practice D) in the standard ten seconds and to an accuracy of 5 degrees.

It is now necessary to consider a method of dealing with a moving source of sound. The problem lies in making allowance for the lag of sound and predicting the future position of an aircraft to within the limits imposed by the field of view of the binoculars. The spotter has no means of doing this other than his own experience and judgment. His training in this process, therefore, must consist of providing this experience, and of developing his judgment of the amount of lead required in various circumstances. Probably the best method of achieving this end is to present the man with a visual impression which he can subsequently be taught to convert into an angular movement of the chair. For this purpose it is convenient to make use of the prediction apparatus shown in Fig. 5.

AC is a light lath of wood at one end of which is fixed a small buzzer A. B is a clothes-pin or spring paper-clip carrying a small model aircraft. The lath is marked off in inches. A simple calculation serves to show that at a range of 10 feet the offset representative of a target crossing at 100 m.p.h. is approximately 16 inches. Let the man be placed in his chair facing the buzzer at a range of 10 feet. Then let him observe the displacement of the target, swing the chair until he is facing the target, and note the angular movement of the chair necessary. This can then be re-

peated with targets on varying courses and with the lath at different ranges with the offset adjusted proportionately. In this way the man acquires experience of the relation between the angle of approach of the target and angular movement of his chair necessary to give his line of sight the correct offset. Now let the binoculars be blanked off by capping the object glasses, and allow the man to combine the two processes of location and prediction by making three swings to fix the direction of the buzzer and then laying off his chair by the correct amount according to the direction of flight of the target, which will have been communicated to him before the exercise commenced. It will be found that with constant practice the spotter becomes adept at this operation and the experience can then be extended by varying the supposed speed of the target as well as its course. The instructor checks the work by looking over the AA sight affixed to the binoculars.⁵

So far, however, we have dealt only in location and prediction in bearing. In the case of the spotter watching for the momentary illumination this is sufficient, since the vertical component is supplied by the beam itself, but in the independent search something further is required. Unfortunately, man's directional sense of hearing is not of great assistance in the vertical plane, so that we have now to resort to a purely mechanical process known as the "upward search." We must here define the fundamental "Law of Searching," whether with a beam or by eye, according to which *any object must remain under observation for at least one second to be perceived by the average observer.*⁶ From this law it follows that no movement of the binoculars should be made at a rate exceeding one field of view per second. Assuming the spotter has accurately predicted the bearing of the target, it remains for him to detect its whereabouts in the vertical arc between the horizon and the zenith. For all practical pur-

⁴The errors can be read off on the inch scale. One inch at ten feet represents approximately one-half a degree. Tolerance in this practice is one-half the field of view of the binoculars in use.

⁵The period of illumination necessary for detection at extreme range is given by Spearman as 1 second; by McDougall as 2 seconds. It is possibly less.

⁶It will be convenient to have this circle of degrees marked on the reverse of the disc used for the orientation practices.

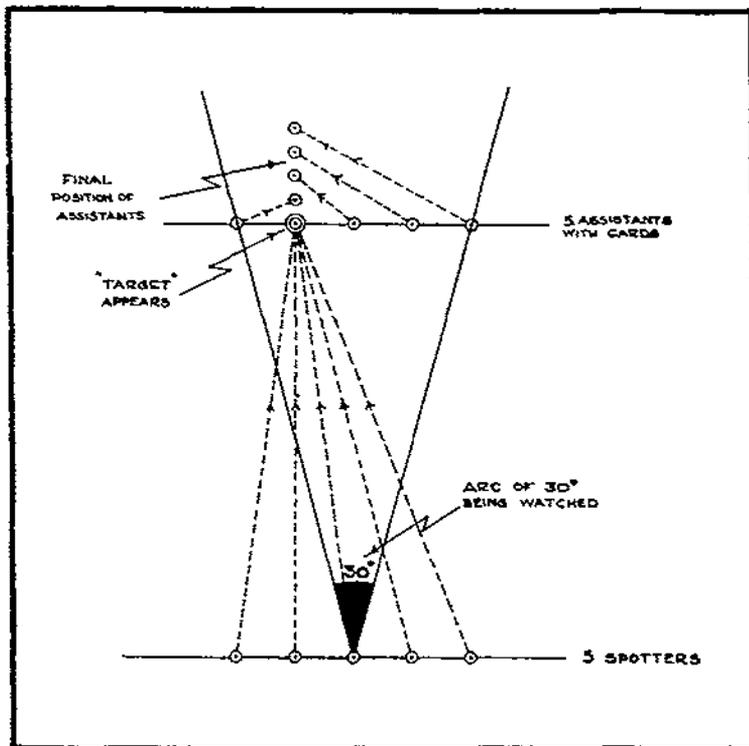


Figure 6

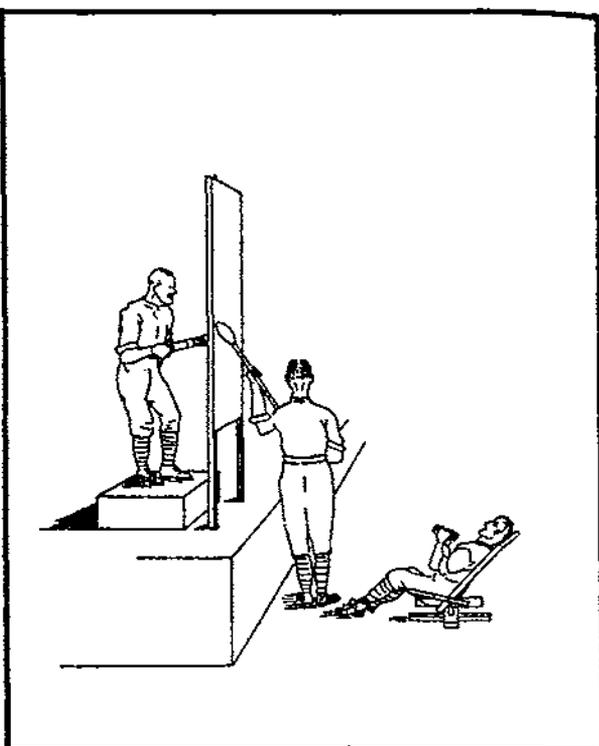


Figure 7

Detection of Momentary Exposures

poses we may disregard targets at elevations below 30 degrees. The "upward search" must then be made through an arc of 60 degrees, from elevation 30 degrees to the zenith at a speed not exceeding 7 degrees per second. It is convenient to allow 10 seconds for this process, and the man should first be schooled to estimate the elevation at which to commence (30 degrees) and timed in the search from that elevation upwards until his line of sight reaches a mark on the ceiling vertically above the chair. When he is proficient in this the three processes of location, prediction and searching may be combined, the prediction apparatus being raised to give varying degrees of elevation. The spotter is now ready to carry out this same practice with a moving buzzer suspended from the buzzer masts, or with actual aircraft targets by day. By constant exercise in these processes with aircraft the man acquires the necessary experience to enable him to bring the target within the field of view of his binoculars by sound alone.

We will now contemplate the factors affecting the action of the second spotter engaged in the detection of momentary illuminations ("flick-overs") in the beams of other searchlights. He is required to watch some four or five beams operating over an arc of perhaps 30 degrees. (See Fig. 3 (a).) By the processes of location and prediction just described he is able to narrow the useful field of search to a horizontal arc of 10 degrees. He is now required to study those portions of (say) five beams as they pass and repass this arc in the process of their own searching. Any other beams which may happen to be exposed at the same time, but which do not enter this arc, can be disregarded, since they are obviously either searching for a different target, or are grossly wrong, while, in

any case, five is probably the maximum number of beams which can be properly studied simultaneously by one man. Now in the normal course of events the spotter is not in the habit of watching more than one object at a time, so that this simultaneous study of five beams is a process demanding special training of the eye and brain. Let an arc of 30 degrees be set out on the floor of the room, or on the parade ground, or elsewhere convenient (Fig. 6). Let the spotter under training be placed at the apex of the angle and five objects distributed over the chord of the arc. It will be convenient for these five objects to be men, and, since it is uneconomical to employ five men to train one, let five pupils be spaced out in line with the apex and parallel with the line of assistants. The angle subtended by the chord at the eye of each man is approximately the same. Let each of the assistants be provided with six small pieces of paper. Among the total of 30 pieces of paper, one shall have a black dot on it, and the remainder be perfectly blank. The assistants turn over the pieces of paper slowly or quickly according to their individual taste, and the spotters watch the five assistants for the appearance of the piece of paper bearing the dot. When a spotter sees the dot he shouts "target seen" and commences immediately to give orders to the assistant facing him so as to bring him covering off the man exposing the dot. Each spotter in turn on seeing the dot proceeds likewise and the practice terminates with all the assistants covering off the man with the dot. The papers are now transferred to the men who have been spotting and the exercise is repeated for the benefit of those who were the assistants. In this way we exercise each man in the process of watching simultaneously five moving

beams, detecting the momentary appearance of a target in one of them, and in commencing instantly to direct a beam on to it. The object of continuing the practice until all the men shall have directed their opposite numbers on to the target is to prevent the weaker or idler spotters from trading on the efforts of the efficient performer by shouting "target seen" immediately they hear the first man do so, without themselves having seen it; since they cannot start directing until they know where the target is. The introduction of the directing practice into this exercise also keeps the assistants alive, since they have to be ready instantly to respond to the orders of their own director the moment he sees the dot. A spotter seeing the target appear immediately in front of him shouts, "Target seen. On Target." The exercise can be made progressively more difficult by the use of playing cards in lieu of the blank papers, a given card being the target, or by the use of aircraft silhouettes, the target required being a given type of machine.

There remain, however, two other processes in this function of the spotter in which this exercise affords no training and for which a further exercise is necessary. In actual practice with searchlight beams by night, neither the beam nor the target remain stationary in the positions at which the "flick-over" was detected. The spotter has, therefore, not only to observe the "flick-over," but to memorize the point in the sky at which it occurred, and to take note of the direction of movement of the target. The following is a simple exercise affording practice in the three processes at once, and in directing. Let a screen of dark translucent material be set up facing a spotter's chair and of such dimensions and at such a distance that it covers a horizontal arc of 30 degrees from the spotter's eye, and extends from an elevation of 30 degrees at the foot to (say) 75 or 80 degrees elevation at the top (Fig. 7). This screen then represents, roughly, the segment of the heavens which the spotter is required to watch. An assistant stationed behind the screen flashes an electric torch at any point on the screen, making an exposure of one second. The spotter observes this flash and notes its position on the screen, shouting "target seen" and proceeding at once to direct a man with a spotting disc so as to bring the disc on to the point at which he imagines the flash appeared. When he reaches the point required he will say "On," whereupon the assistant once more exposes the torch in the same spot and the spotter is enabled to check his power of memorizing the point of illumination. When this stage has been successfully reached by all the class, the exercise is repeated, but the torch is then moved throughout the practice. The spotter thus detects a moving flash, memorizes the point of illumination, notes the direction of flight of the target, and brings the beam on to a future position which he predicts from these observations. When "on," the torch is again exposed (still moving) and the errors are checked.

This concludes the group of practices in Location and Detection designed to afford exercise in the several processes of:

- Location by sound;
- Prediction for moving source;
- The upward search;
- Detection of momentary illuminations;
- Memorizing the point of illumination;
- Observation of direction of flight;

and to develop the link between eye, brain and voice, which is necessary to insure that directing commences the instant the target is seen.

FOCUS AND SCRUTINY

In the practices which have already been considered, we have assumed that our spotter will have seen the target if it is there to be seen, but this assumption is clearly inadmissible since the conditions under which the work is carried out in actual practice are so disadvantageous as to render the visual processes required of the man in some respects the most difficult of all. When the recruit appears before the medical officer on enlistment, he is subjected to a test of eyesight involving the reading of quadrangular black print on white paper. This combined operation of eye and brain we term perception. In such normal use the eye sees principally what the brain expects it to see (i.e., the print upon the page of a book) and no great effort in perception is required. When unusual or unexpected sights meet the eye, the casual observer fails often to perceive at the first glance the essentially unusual characteristics in what he sees and, if interested, proceeds to look again and more closely. The subsequent mental process of analyzing what is perceived and of converting it into (say) a lingual description we may call appreciation. This sequence of perception and appreciation becomes very highly developed in certain occupations, especially among those who habitually make use of the microscope or telescope,⁷ but with the untrained man takes time which cannot be spared in the anti-aircraft engagement. The process of perception and appreciation is naturally aggravated by elements of confusion which, in the practical work of the spotter, are contributed by weak aspect of the target, very low contrast between the aircraft and its background,⁸ glare, stars, insects in the beams, etc., and by the unaccustomed appearance of distant objects magnified several diameters. For these reasons it is important that the spotter be trained to avoid careless observation and to perceive and appreciate readily the presence of a target in the worst possible conditions of confusion. This training will depend for its success upon the extent to which the brain of the pupil can be enlisted on the side of the instructor.

For this purpose we must have recourse to special tinted sight cards and to confusion cards in which the pupil learns to strive to detect objects not at first sight apparent.

⁷An expert has stated that it would require two years to make a man really proficient with binoculars, but that he could not guarantee to raise a pupil to the standard of proficiency attained by the Highland ghillie with the telescope in a lifetime.

⁸In action the spotter is required to detect targets in conditions of very slight contrast, the aircraft forming a jet black silhouette before a background of sky having the appearance of the darkest blue velvet or, at best, a silver object upon a beam of electric blue.



Figure 8: Confusion Card

Figure 8 suggests an arrangement for one of these types. It appears to the careless observer as a capital letter "T," and only the skilled eye and brain detects immediately the component elements. Infinite variations are possible in this practice, the important point being to keep the pupil's eye and brain alert and to foster the characteristic of inquisitiveness and the determination of the spotter at all costs to outwit the ingenuity of the instructor in designing the cards. Combinations of tinted and confusion cards are obviously an advanced stage of this part of the training and the period of exposure and scale of illumination should also be progressively reduced, or the element of glare vision added by placing the source of light unshielded between the observer and the target. By constant practice the spotter should become able to satisfy the normal tests of standard eyesight even in the worst conditions of confusion, contrast and illumination in the minimum of time.⁹

Although these exercises should at first be carried out with the naked eye, they obviously form an important part also of the training of the spotter with his binoculars. Before they can be undertaken with glasses, however, it is necessary for the man to be initiated into the method of using this instrument. In assuming that any man can naturally use the binoculars we make one of the commonest mistakes in this branch of training, and it is safe to aver that only one man in a hundred of the type from

⁹Where apparatus for snaphooting targets is installed in miniature ranges this will be found particularly suitable for this type of exercise. Alternatively, a box may be constructed containing an electric light and some form of card holder, or the cards may simply be exposed by hand.

which our spotters are drawn has ever even seen such an instrument outside the windows of a pawnshop, or has the slightest idea of what constitutes clear focus. The practical details of the purely mechanical process of focusing are perhaps sufficiently well understood to call for no description here, but there are two fundamentals which must not be omitted. The first of these relates to the distance at which focus can be ascertained.

From any point 70 yards distant a pencil of light may be regarded as consisting of parallel rays and this point will be seen by the normal (emmetropic) eye without any effort of accommodation. This point, either at this distance, or in infinity is called the "*punctum remotum*" or the most distant point seen without accommodation. It follows that for long-range focusing of the binoculars (as required for anti-aircraft work) a minimum distance of 70 yards is required. In the preliminary training of the Territorial Army especially, this range will seldom be obtainable and it will often be necessary for exercises with the binoculars to be carried out at shorter ranges. It should, however, never be less than 20 yards and it must be remembered that the focus settings ascertained in these circumstances will not be precisely the same as those required by the spotters in action. If this limitation be clearly understood the spotter may be trained in all the processes of telescopic vision in the drill-hall.

The second fundamental affects the design of the sight cards to be used both with and without the binoculars. The standard eye (according to Snellen) identifies quadrangular letters subtending a visual angle of 5 minutes. At a range of 10 feet this implies lettering $\frac{3}{16}$ inch high; at 20 feet, $\frac{3}{8}$ inch. Through binoculars the same eye should recognize letters subtending a visual angle of $\frac{5}{M}$ minutes, where M is the magnification of the instrument.¹⁰ Thus with an instrument offering a magnification of 4 diameters, the lettering on a target for use at 20 yards should be $\frac{9}{32}$ inch high; at 70 yards—1 inch high. These figures clearly govern the standard eye and focus tests, and *there is no satisfactory method of checking that a man has his glasses correctly focused and adjusted other than by the use of sight cards with lettering of the correct size used at the correct range.* All the exercises mentioned will, therefore, consist in ascertaining the maximum range at which the spotter can read the standard print clearly, or alternatively, the smallest print which he can conveniently read at a given range. Since when viewing a distant object through binoculars with the eyes in the required state of rest, the image will only appear distinct when each eye-piece has been separately and correctly focused and the distance apart of the eye-pieces correctly adjusted to suit the inter-ocular distance of the user, the spotter will be required to practice with each eye independently as well as with both eyes.

¹⁰The characteristics of the British service binoculars concerned are as follows:

No. 4	Magnification	X6.	Field,	11 degrees.
No. 5	"	X7.	"	7 "
No. 6	"	X4.	"	12 "

The process of accommodation, being a muscular process, if prolonged produces fatigue and gives rise to eye-strain and headaches. It follows that, when using an optical instrument such as the binoculars, the eye should be relieved of all strain possible by allowing it to rest in the normal state for distant vision, and the necessary adjustments made in the lenses of the instrument itself. The observer about to use binoculars will, therefore, fix his eyes on the distant object and endeavor to bring the instrument into position before his eyes without altering their accommodation. The observer must never try and look into the glasses with the intention of seeing an image inside them, but will look through them, as if they were not there, at the distant object. This is comparatively simple so long as the distant object is visible. By night, when the binoculars are to be used for conducting a search of the dark sky, there will be no means other than the experience of the observer of ensuring that the eyes are maintained in the normal long-range condition. If they are not, clearly the focus settings ascertained by day will no longer apply. This is one of the principal objects of constant daylight practice with the binoculars. Even if the proper use of the instrument be mastered, telescopic vision induces a marked fatigue in the observer and for this reason continuous observation should never exceed two minutes.

In daylight, visual acuity is sharpest at the Point of Fixation of the eye (i.e., that at which the eye is directed), the image of which falls on the highly-sensitive macular region in the center of the retina. Thus, if we fix the eye on the center of a line of print, it is seen distinctly and in sharp focus, but the words towards each end of the line are vaguely defined. If we wish to see each word distinctly we "run the eye" along the line. When using the binoculars in normal daylight conditions, with the eyes in a state of light adaptation, the observer automatically keeps the object in the center of the field of view, thereby preserving the visual impression at its sharpest. When conducting a search of the dark sky, however, the target is liable to lie at any point in the field of view and only on the rarest occasions at its center. It follows that, when using the binoculars for these purposes, the eye must not be permitted to dwell on a particular Point of Fixation within the glasses, but must travel over the whole of the Field of View. This travel is known as Scrutiny of the Field and is an essential process of the spotter's work. An alternative to a scrutiny of the field would seem to be the swinging of the binoculars around the determined point, but this is not appropriate for the following reason, which also dictates the manner in which the scrutiny should be carried out. Whereas under ordinary illumination stimulation of the central part of the retina gives rise to by far the most acute visual impressions, the reverse is the case under dim illumination when the eye is in the condition known as dark adaptation. The macular region then becomes the least sensitive part of the retina and is, indeed, "night blind." This fact was discovered very early by astrono-

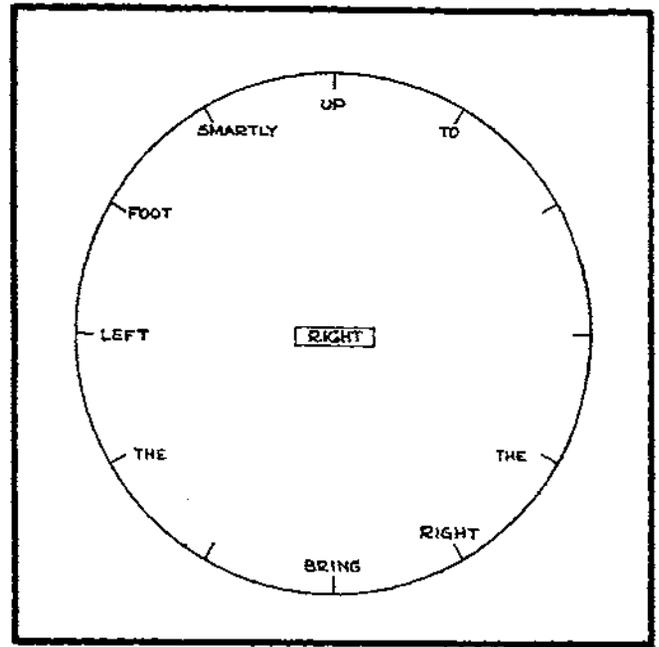


Figure 9: Scrutiny Target

mers, who observed that stars appeared unmistakably brighter if looked at slightly eccentrically.

When searching for a target with the binoculars the danger is that, although the spotter may have directed his instrument with sufficient accuracy for the target actually to lie within the field of view, it may leave the field of view before he perceives it to be there. The most dangerous point will then be the "leading point" of a target under such conditions and it is, therefore, necessary to employ a standard system of scrutiny of the field which takes account of as many as possible of the factors without becoming too confusing to the spotter himself. The majority of targets will be approaching rather than receding, and the danger-point will therefore in most cases lie in the upper semicircle of the field of view. The scrutiny accordingly always commences at 6 o'clock, thus ensuring that objects at and around 12 o'clock are viewed eccentrically and therefore under the most favorable conditions for perception. If the target is proceeding right-handed the next most dangerous area lies in the right-hand semicircle, or clockwise. If a left-handed target, counter-clockwise. The scrutiny continues around the periphery of the field of view until the target is perceived, or until the eye returns to 6 o'clock, when the binoculars must be shifted to a new point of fixation and the process repeated.

The training of the spotter in this process is progressive from the exercises in perception and appreciation and consists of practice with cards arranged approximately on the periphery of the field of view. At 20 yards a field of view of 7 degrees is represented approximately by a circle 7 feet in diameter—12 degrees, 12 feet, etc. At greater ranges part of the field of view lies on the horizontal foreground, but this can easily be calculated and set out by means of pegs. The center of the field of view or point of fixation must be defined, and it is here that we expose to view, in characters of suitable size for the range employed, the

instructions as to the direction of flight of the supposed target, i.e., right or left. The man aligns his binoculars first on the point of fixation (as in the process of location) and there ascertains the direction of flight, from which he deduces the direction of rotation of the scrutiny. This sequence follows the sequence of thought in the actual engagement. Around the periphery are arranged cards bearing letters which the spotter is required to read out in turn. Later they may be arranged to spell a word, or consist of words arranged to make an intelligible sentence, if read in the correct sequence (Fig. 9). In either case the sequence starts at 6 o'clock, so that the man forms a habit of glancing immediately to the bottom of his field of view.²¹ The word or sentence need not occupy the whole periphery of the field of view, but may end at any point, the remaining cards being marked at random. The man checks at the break in the sequence as if on target. When he is proficient at these simple reading tests, the cards may be replaced by aircraft silhouettes, the point of fixation as before defining in words the direction of flight, and a notice at 6 o'clock indicating the particular aircraft nominated as target. The man then continues his scrutiny identifying each aircraft in turn until the one required is reached. Or the targets may consist of blank or colored cards on one only of which is a dot or word representing the target, the man being required to declare at what o'clock the target is, and being timed in the process. Each hour representing 30 degrees, it is then possible to check whether the scrutiny is being carried out at the speed demanded by the Law of Searching. In time, elements of confusion can also be introduced and the training will culminate in combination exercises involving, perhaps, several contiguous fields of view, in which the processes of:

Focusing;
Perception;
Appreciation; and
Scrutiny;

will have been performed against time under all conditions of confusion, contrast and illumination.

DIRECTING

We may now assume that the spotter has correctly oriented himself, accurately located the position of his target, and actually seen the aircraft either with the naked eye or with his binoculars. It remains for him immediately and efficiently to direct the beam on to it. This function of the spotter is fully dealt with in the manual and is generally well understood. There is little that can usefully be added here except to emphasize that the basis of all training in directing must be the practice (Fig. 10) in which the spotter under instruction endeavors to direct a man carrying a wooden disc to cover off a second disc held stationary or moved by a third man. Normally the spotter

²¹Note that, as these exercises will be carried out in conditions of light adaptation, the man actually sees most clearly that arc of the periphery at which he directs his gaze, and learns only subconsciously the process of removing the night blind region from the area required to be seen most distinctly in circumstances of dark adaptation.

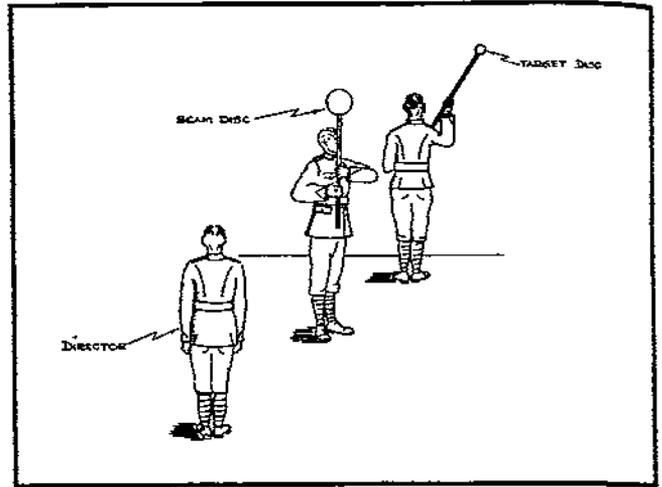


Figure 10: Disc Drill

is probably not in the habit of ordering anyone to do anything, and almost invariably experiences the greatest difficulty and displays considerable lack of confidence in giving his orders. He will be seen at first to endeavor to support his orders with movements of the hands and arms, these members being most probably his normal medium of expression. In disc practice he is not only obliged to rely on his voice alone (because the man he is directing is not facing him and cannot therefore see his movements), but has to raise his voice to be heard above the other members of the class and in this way not only learns the correct tones and words of command, but gains confidence and develops the voice as well. We do not mind at this stage at what speeds the beam and target discs move, since our object is to teach the man to control the movements of another at a distance. The speeds can be corrected when we enter the dark room for following practice with a miniature beam and target, but the time element must be introduced early, and consequently the reduction to a minimum of the orders given to bring a beam on target. For this purpose it will be found convenient to make use of the well-known exercise with the squared blackboard, and then to practice directing a disc on to the bull of a normal musketry target in a given time, points being deducted for wrong or unnecessary orders.

MENTAL AND PHYSICAL

It will be conceded that the various processes required of the spotter in the execution of his rôle in the searchlight detachment call for very highly developed links between eye, brain and voice, and to some extent also between brain and muscle. To develop this necessarily high degree of alertness it is desirable that the spotters' class should be conducted on the principles used in physical training. The class should invariably move at the "free" double and, whenever the instructor desires to address them as a whole, "fall in" at the double. For any one period of instruction, exercises should be selected from each group of practices and in sufficient numbers to avoid any one of them becoming tedious. As far as possible, also, each individual man should be set a different

problem in each practice. The order of practices should also be varied and short periods of manning drill, or foot drill without arms (in which multiple orders and other enlivening elements can be introduced), can be interpolated. In these ways the spotters are kept continuously on their toes, mentally and physically, and form the required habits of mental alertness, quickness and activity.

CONCLUSION

Unlike the training of engine-drivers and searchlight-operators, we are faced in the training of spotters and listeners with making men proficient in a subject which has no counterpart in civil life. We have here the problem of developing the senses, but, whereas the sound locator provides in itself a ready means of demonstration, checking progress and registering the results of the listeners' work, the functions of the spotter furnish us at present with no such opportunities. Telescopic vision, moreover, is an art practiced by few among those from which our potential spotters are drawn. Authorities contend that it is among the most difficult arts to acquire, demanding long periods of constant practice to achieve perfection. By its very nature there is no opportunity for demonstration, and the degree of perfection attained must remain forever

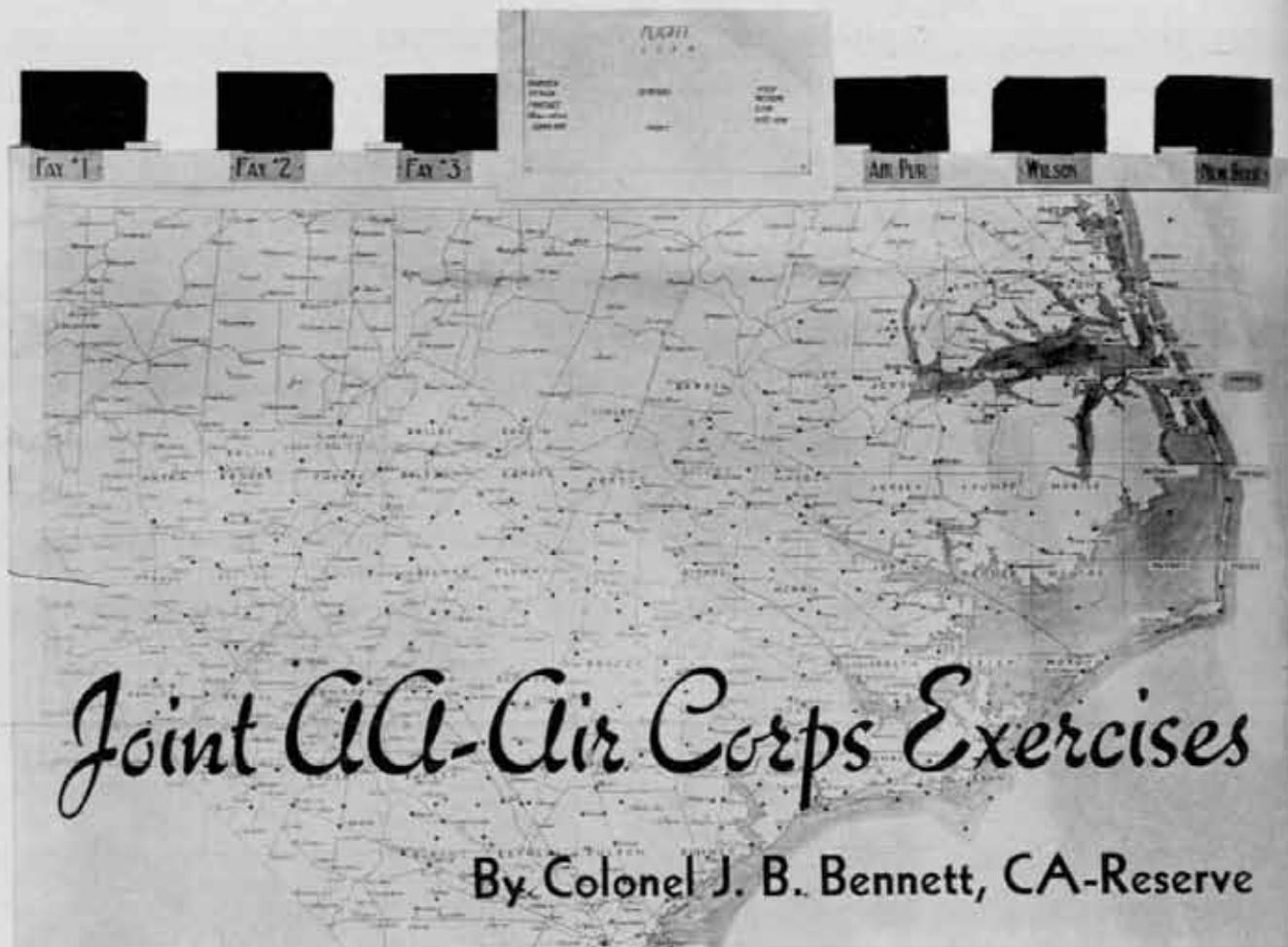
known only to the pupil. The training of the spotter is therefore the more difficult by reason of its intangibility, and it is this very intangibility which creates the impression that the spotter's rôle has little or nothing to it. This impression, in turn, is the principal cause of the marked unpopularity of this particular duty in the detachment.¹²

One of the principal objects of the system of training outlined above is, therefore, to furnish a scientific framework upon which to build, and to provide a basis for a series of tests to which both instructor and pupil can relate their progress. The difficulties which have been enumerated, combined, with the necessity for accepting often the poorer material in the ranks of the spotters, demand the closest attention to their training, and call for the greatest care in the selection and qualifications of their instructors.

¹²Applicants for enlistment in units of the Territorial Army have been known to offer their services only on the understanding that they are not to be employed as spotters! In this connection it is important that the expression "Games" and "Gadgets", so loosely used in relation to the methods of training the spotter, be omitted entirely if the true importance of their work is to be impressed upon the class, and the more appropriate terms "Practice" (or "Exercise") and "Apparatus" (or "Appliance") substituted.



Over 1,000 fighting planes recently took part in maneuvers over southern England. Here we see the gunners of a fighter squadron, ready to step into their planes.



The air defense exercises conducted at Fort Bragg, North Carolina, beginning Monday, October 10th, were the largest maneuvers of this sort ever held by the United States Army. Weeks had been spent by Brigadier General Fulton Q. C. Gardner, the defense commander, and Colonel Sanderford Jarman, his chief of staff, in preparing for the defense of an airfield located near the center of the huge Fort Bragg Military Reservation. There were a number of problems facing the antiaircraft artilleryman on the ground and the fighting flyers in the air for which a solution was sought.

Considerable time was required to organize the civilian warning net, to be manned almost entirely by volunteer, public-spirited citizens in each community. An observation post, connected by telephone to the message-relaying stations at New Bern, Wilson and Fayetteville, was set up every eight miles over the probable path of the invading "Black" enemy air force. In addition, each fire lookout tower located in this area was manned by a Reserve officer in charge of a small staff of soldiers. The Coast Guard also participated.

Preparations for the warning net were most complete. The cooperation of local Chambers of Commerce and similar organizations was solicited in organizing the obser-

vation posts. The American Legion Posts were especially helpful in setting up the volunteer organization. Some 1,500 local observers had to be selected and trained. Fifteen independent telephone companies had to be tied into the communications net-work. Publicity concerning the maneuvers was freely given by all of the newspapers in Eastern North Carolina.

The defense consisted of four regiments of antiaircraft artillery. This is our entire antiaircraft artillery force east of the Mississippi, which indicates our woeful shortage in antiaircraft defense equipment and personnel. A squadron of pursuit planes was attached to the defense to "intercept" and attack the Black air force before they could reach the vital point of attack. The above forces, together with the civilian warning net, made up the defense.

The Black air force, under the command of Brigadier General A. N. Krogstad, consisted of reconnaissance, attack and bombing planes, based at Langley Field, Virginia. The enemy air invaders included the famous Flying Fortresses, gigantic four-motored bombers with a cruising speed of 240 miles per hour and capable of reaching an altitude of 25,000 feet with full load.

By the morning of October 10th, all was in readiness. A huge map of Eastern North Carolina, with an electric

An all-round defense will keep aircraft at altitudes too high for accurate bombing

bulb showing the location of each observation post, had been set up in defense headquarters. The illustration accompanying this article gives only a faint idea of its size.

The time is 4:00 A.M. After a hastily-gulped eye-opener of hot coffee, we find gathered around this mammoth plotting board some forty of the leading Coast Artillery and Air Corps officers from the principal army posts east of the Mississippi, including the entire membership of the Air Corps Board from Maxwell Field, Alabama. Newspapermen from the leading dailies are seated at the tables, pencils poised. All are tense. All ask themselves the same question: "Will the volunteer civilian observers be able to hear the high-flying planes?" "Will this hastily-organized staff of farmers, merchants, doctors, lawyers, and housewives be able to do the job?"

The enemy bombers have already left Langley Field and are approaching the North Carolina shore over a route unknown to the defenders. Five long minutes pass. And then the blare of the loud-speakers located atop the large plotting map! "FLASH—LISBON 22—SEVERAL PLANES HEARD—FLYING HIGH—IN A WESTERLY DIRECTION—TIME 4:05 A.M.!" And the lighted bulb on the huge map shows that the report had come from the observation post located at Point Lookout, some 150 miles southeast of Fort Bragg! Ten exciting minutes—and another FLASH! The faint roar of the high-flying enemy planes had been picked up and reported by the observer twenty miles to the westward. And then another FLASH—and another! A look of relief and satisfaction spread over the faces of General Gardner and Colonel Jarman. Their weeks of careful preparation were rewarded. The civilian observers had not failed.

As soon as the probable path of the oncoming Black air force had been definitely determined, the defending pursuit planes took off and gained altitude. Their mission was to get above the enemy and "attack" as soon as the "Black" planes were illuminated by our outer ring of searchlights. As soon as the enemy came within range of our antiaircraft guns, they went into action, using camera flash bulbs to simulate firing—and the fight was on.

After the enemy had withdrawn and returned to his base at Langley Field, the reports made by the opposing forces were studied. The defending pursuit planes claimed thirty-one enemy flyers had been "intercepted." The attacking bombers claimed they could have destroyed the air base without difficulty. But, out of it all came one definite admission by both sides. The civilian warning net had functioned effectively. Bombers flying even above 20,000 feet could be heard and their general direction reported to the message center.

During the week of the exercises, two tactical problems daily were conducted—one from 4:00 A.M. to 8:00 A.M. and the other from 7:00 P.M. to 11:00 P.M. The days were devoted to inspection trips to gun and searchlight positions and to sitting around and talking shop. A few hours of bunk fatigue helped one to bear up under the 19-hour a day schedule.

During these exercises, a flying fortress was illuminated

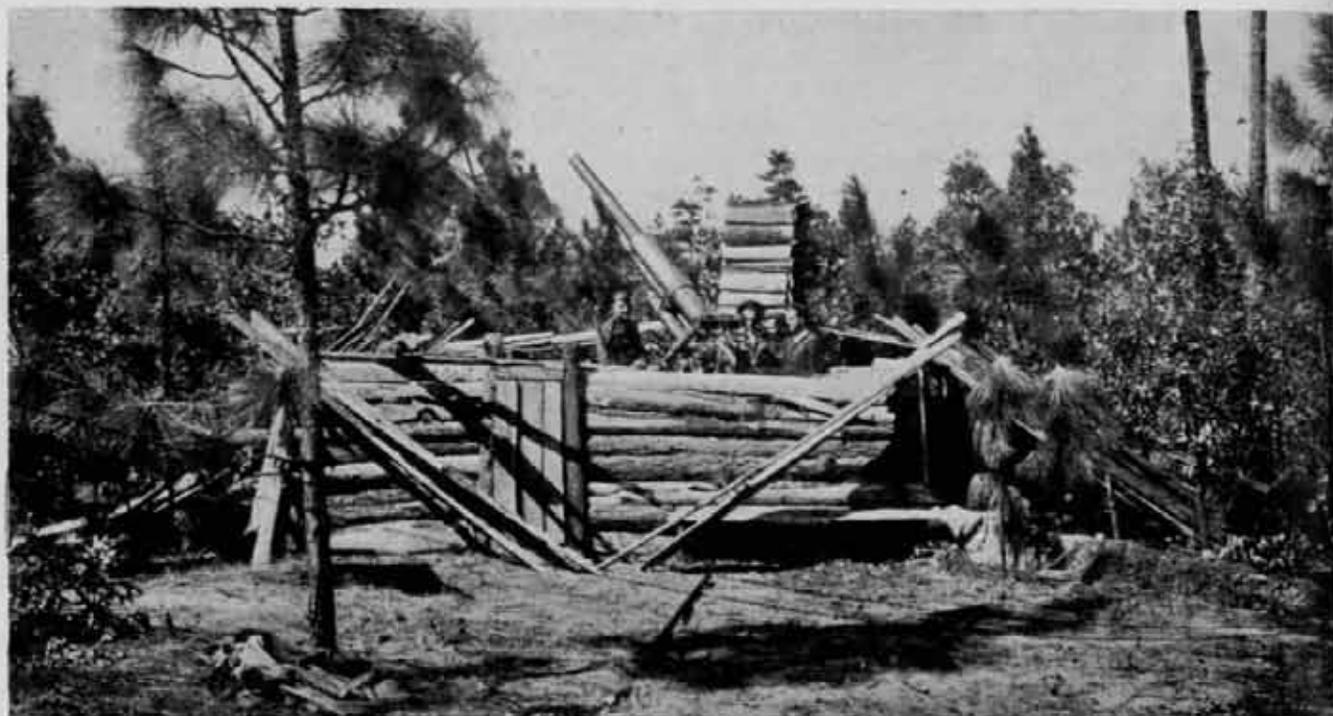
by our searchlights at an altitude of 24,000 feet. Yet, on the nights when we had a brilliant moon, most of the planes came right from the direction of the moon, and our searchlights had real difficulty in lighting up many of them. Before the moon came up, the searchlights functioned very effectively. The new, greatly improved Sperry sound locator would, undoubtedly, have resulted in better searchlight results. The Marine Corps is reporting phenomenal success with the improved horns.

One of the exercises involved laying a smoke screen over the defending gun positions, to be previously located by the enemy reconnaissance planes. This mission is entrusted to the low-flying attack planes. The smoke screen need not necessarily blanket the gun positions. The purpose is primarily to prevent the observers at the director from seeing the bombers which will follow as soon as the smoke screen has been laid.

Throughout the day preceding this exercise, enemy reconnaissance planes had been permitted to take aerial photographs of the defended area in an attempt to locate the gun positions. So effective a job of camouflage had been done that not a single gun was located. I made a tour of the gun positions and would easily have passed within twenty feet without locating them had not Colonel Jarman accompanied me. There was one exception. This particular gun crew had used imagination and ingenuity. They made a small clearing around the gun position and built a log cabin over the gun. A removable roof concealed the gun during the day, and a burning smudge kept smoke coming out of the dummy chimney. A clothesline and an outdoor well completed the deception. Little would an overhead reconnaissance plane suspect that, beneath the roof of that mountaineer shack, was concealed an engine of destruction capable of bringing down his largest bombers with one well-placed burst.

Knowing the terrain of a defended position, the enemy can still make a good guess as to the location of the directors, because they must be on the high points of ground nearby. In the exercise conducted at Fort Bragg, a fairly large smoke screen was laid, but the bombers did not allow enough time for the smoke to spread and completely blot out the gun and director positions. They were consequently subjected to antiaircraft "fire." This, however, is beside the point. *If* enemy reconnaissance planes are able to locate your gun positions, and *if* their attack planes succeed in running the gauntlet of your machine guns and laying a smoke screen, the bombers which follow can attack without being subjected to shell-fire from below *if* the smoke doesn't also conceal their objective! But that's a lot of "ifs."

Thursday, October 13th, was the big night. A "black-out," affecting a population of some three-quarter million was to have a trial. All lights were to be extinguished for a period of forty-five minutes during the overhead flight of the "enemy bombers." All motorists were to be stopped as they entered each town, ordered to pull to the side of the road with headlights turned off. The residents were to turn out their lights. Merchants were to turn out their



Ready for business despite the log cabin disguise. This is one of the 3-inch AA guns that participated in the Fort Bragg exercises.

neon signs and restaurants were to operate by candlelight. Only hospital operating rooms were allowed electric lights, but shades were to be drawn. Babies have a way of coming into this world at the most inopportune time. They recognize no military orders.

The signal for the "black-out" was to be flashed by radio from Fort Bragg as soon as the warning net disclosed that the Black bombers had reached the designated area. The residents of each town were to be signalled by the sounding of the local fire siren. The execution of the "black-out" was placed in the hands of local police authorities, assisted by National Guard units and Boy Scout troops.

Because of bad weather at Langley Field, the enemy bombers flew to Fort Bragg late on the afternoon of the scheduled "black-out." The plans were changed. They would fly out to the edge of the "black-out" zone, and then come in. Several of the newspaper men requested permission to observe the "black-out" from the air. I managed to squeeze in with them. Our ship was Flying Fortress No. 61—one of the goodwill bombers which made the round-trip to South America. When I climbed aboard I was asked whether I had brought along a toothbrush. For if the storm coming in from the west beat us to Fort Bragg, we might have to land at San Antonio.

I was permitted to take a position in the forward bombing bay. After we had gained altitude, I had an enviable view of the darkened panorama, some 12,000 feet below. We flew some 120 miles northeast, then turned back and headed for Raleigh, the last lighted city from which to take a bearing. We then flew blind the remaining fifty miles to our objective. In the cities the "black-out" was almost 100% effective; but, out in the rural areas, the crossroad

filling stations and roadside stands, and the stream of automobile headlights, clearly delineated the main highways. It was 7:30 P.M. and everybody was on his way to the movies or to the State Fair at Raleigh. We were, therefore, able to locate our target without any difficulty and to "drop our bombs." However, in time of actual war a "blackout" could easily be enforced in the rural areas as well as in town. If enemy aircraft were near, all cars would be required to drive at night without headlights, and then only with military permits.

If a "black-out" were 100% effective, and no waterways disclosed the location of the defended position, the enemy planes would have to fly over unfamiliar terrain by celestial observation. By this method of navigation, they could probably come within five miles of their mark. Their reconnaissance planes would then drop flares. If the objective were located, a pilot flare of a different color would be released immediately over the spot to be bombed, when the bombers would speed in and go to work. All this, of course, on the assumption that our ground forces didn't object.

As we passed over the defended area, we were in a searchlight beam twice. The glare was like facing an automobile headlight. I was blinded. I am convinced that the bomber would have difficulty in accurate sighting so long as his ship was in the beam. I might explain that no attempt was made to get us in the beam. All twenty-nine of the searchlights were pointed in a cone as we went over as a display for the hundreds who had motored out to Fort Bragg to watch this maneuver. I did notice, however, that a thin cloud formation about 3,000 feet below us stopped more than two-thirds of the beams. Yet we could see through this thin layer of moisture haze to the ground.

A ray detector, based upon an entirely new principle, would solve this real difficulty.

When I alighted my legs were stiff from staying in a cramped position in the forward bombing bay during the 315 miles flown. My ears were roaring with the noise of the four super-charged engines. I was numb with cold and dizzy from my temporary diet of oxygen. But I returned from the flight with a firm conviction that enemy airmen, unfamiliar with our terrain, would face a really difficult problem to locate an objective of small area during a 100% "black-out." I also came away with a feeling of real pride in our Flying Fortresses which are, without question, the equal of any bomber in the world today.

The statements given to the press by General Gardner, the defense commander, and General Krogstad, the commander of the Black air force, at the close of these maneuvers give a very concise picture as to their impressions of the value of these joint exercises. I quote them in full:

General Gardner—

The Joint Antiaircraft-Air Corps Exercises concluded today at Fort Bragg, was the most extensive exercise of its kind that has ever been conducted in this country.

Its purpose was to afford an opportunity for testing our tactical doctrines, both for the attack from the air and for the defense against each attack, and for determining what changes, if any, are necessary in our tactical doctrines, organization and matériel under present-day conditions.

The defense command has consisted of the antiaircraft artillery, the pursuit aviation and the warning net.

The exercise has afforded to the antiaircraft artillery, for the first time in our service, an opportunity to assemble and install a complete all-round defense, and to test out, under conditions closely simulating those of actual service, many of the features of such a defense which have heretofore been based upon theory only. From a tactical standpoint valuable experience has been gained in reference particularly to the organization, the command and the communications of such a defense. In general this experience has indicated that the present approved doctrines in these matters are sound and in accordance with present-day conditions.

From the standpoint of antiaircraft artillery matériel, the exercise has shown that, in general, the present matériel, if installed in a complete all-round defense, will serve to maintain all types of enemy aircraft at altitudes which will render exceedingly difficult accurate bombing of a defended objective of limited area, particularly at night, and that in the case of a large area target antiaircraft artillery alone cannot be expected to provide a complete defense. Efficiently manned antiaircraft artillery may be expected to force enemy bombardment aviation to attack at increasingly higher altitudes and this will, in turn, impose upon the antiaircraft artillery greater difficulties in the detection and attack of bombardment aviation and will require the development in all types of antiaircraft artillery matériel, including the guns, machine guns and

the sound locators keep pace with such increasingly difficult requirements as may result from the increased altitudes at which bombardment may operate.

The exercise has shown definitely that both pursuit aviation and antiaircraft artillery have important rôles in antiaircraft defense, that each supplements the other, and needs the coöperation of the other, and that joint training is necessary in order to insure the most effective use of both in war. It has shown that, in the daytime, an effective antiaircraft warning service is necessary to enable pursuit to intercept and attack the enemy effectively, and that, at night, pursuit cannot attack effectively without searchlight illumination. The exercise has afforded opportunity for testing out various methods of enabling the antiaircraft artillery searchlights of a defended area to be used for both the antiaircraft artillery and for the pursuit, and the experience gained in this connection will constitute a basis for further tests in future exercises.

One of the chief purposes of the exercise has been to test the practicability of utilizing civilian observers to man the observation posts in the antiaircraft warning service, and to determine the extent to which existing commercial and other telephone facilities can be expected to meet the requirements of a warning net. The experience gained in this exercise, through the voluntary coöperation of some 1,500 citizens in some thirty-nine counties of North Carolina, has shown conclusively that in this exercise civilian observers have manned such a net very effectively, and, as the result of the efficient work done by the fifteen independent telephone companies operating in the thirty-nine counties involved, it has demonstrated that in this State at least the existing telephone facilities can be relied upon to meet all the requirements of such a net.

In this exercise some sixty towns and cities in North Carolina, extending over some 15,000 square miles with a population of some 750,000 people, were blacked out. In general the blackout was very effective, particularly insofar as concerned the towns themselves. It was, however, demonstrated that, in order to make such a blackout thoroughly effective, it would be necessary that motorists on the principal roads, between towns, extinguish their headlights.

The experience gained in the organization and operation of both the warning net and the blackout, through the voluntary coöperation of the citizens of the areas concerned, will be of great value to the War Department in the development of plans for similar defensive installations, on a much greater scale, in time of war.

The active and effective coöperation of the thousands of citizens of North Carolina who have contributed so generously of their time and efforts in the organization of the warning net and of the blackout, has been a major factor in the success of the exercise, and I desire, in behalf of Major General S. D. Embick, commanding the Third Army, under whose supervision the exercise was conducted, to express to all those who shared in this work the appreciation of the War Department of their public spirited

and patriotic cooperation. They have rendered a real and important service to the national defense.

General Krogstad—

As a result of the exercises concluded tonight, it appears certain that a warning net manned by public-spirited citizens constitutes an important service to defending anti-aircraft and pursuit.

Properly trained bombardment flying at high altitudes can be detected, but seldom illuminated.

Any hostile aircraft flying at low or medium altitudes are apt to be badly treated by well-trained anti-aircraft artillery, unless illumination can be prevented by surprise; a coordinated attack; or by taking advantage of the suitable weather conditions of the moment.

Surprises, and coordinated attacks are exacting maneuvers, and difficult to secure after long flights. It would seem then that bombardment will usually resort to high altitudes, or utilize suitable weather conditions on information furnished by their reconnaissance airplanes.

Limiting the attacking forces to two four-hour periods of operation in twenty-four hours takes the initiative away

from the attacking forces, and alerts the defending forces. It prohibits surprise, and prevents the use of suitable weather condition. Confining the attacking forces to one sector of approach likewise restricts their scheme of maneuver. The efficiency of neither the anti-aircraft nor air force was a matter of issue in these exercises.

To celestial navigators, a blackout presents no insurmountable difficulties. A partial blackout is wasted effort.

The attacking air force secured valuable data in trying out and perfecting various methods of attack; in communications; in navigation; and in the accumulation of essential weather data.

A fine spirit of cooperation was evidenced by all concerned with the exercises. Valuable assistance was furnished by the Navy Department and the Civil Aeronautics Authority.

Adequate national defense requires close cooperation between anti-aircraft and air force elements. These exercises have brought our related problems before the critical audiences of each other's personnel; and our mutual problem of national defense will thereby be brought closer to a satisfactory solution.



The British test their defenses against air raiders. A machine gunner mans a sand-bag post. Notice that he is clad in gas-proof clothing.

The Camouflage Problem at Fort Bragg

By Lieutenant R. R. Arnold, Corps of Engineers

In the next war our most important installations and areas within range of enemy bombers will be protected by antiaircraft artillery. When the bombers come over, they will be accompanied by fast low-flying planes to destroy or smoke the antiaircraft batteries so that the high-flying bombers can carry out their mission without interference from ground artillery fire. If the pilots of the low-flying planes can see the battery or have its location plotted on a map or aerial photograph before leaving the home airport, they will probably be able to accomplish their missions in spite of machine-gun defense. On the other hand, if these pilots cannot see the battery and do not know where it is so that they must locate it by flash, the battery will have more warning of the planes' approach and a much greater chance of driving off or destroying enemy bombers. Hence, concealment of antiaircraft batteries by camouflage is of the greatest importance.

I had the privilege of attending the Antiaircraft Artillery Air Corps Joint Exercises held at Fort Bragg, during October, 1938, as assistant to Lieutenant Colonel D. H. Gillette, Corps of Engineers, camouflage adviser to the Blue Provisional Antiaircraft Brigade. I also visited the Black Air Forces at Langley Field. The exercises involved the defense of Airdrome A at Fort Bragg by a Blue Provisional Antiaircraft Artillery Brigade against Black Aviation. The brigade consisted of a Headquarters, the 61st, 62d and 69th Coast Artillery (AA) and batteries A and C of the 2d Coast Artillery (HD). The Black Air Force was made up of a wing headquarters, a reconnaissance squadron, two bombardment groups, two composite squadrons and an attack squadron.

The exercises were divided into three phases: a preliminary phase from October 3 to October 10, a principal phase from October 10 to October 15, and a reserve phase from October 15 to October 19. The antiaircraft artillery was at Fort Bragg for some time prior to the beginning of the joint exercises on October 3 so batteries could be in position at that time. We went to Fort Bragg

on September 25 to be present when the batteries were camouflaged.

The Fort Bragg reservation is in gently rolling country, cut up by a maze of sand roads and trails. Most of the terrain is thickly covered with scrub oak, varying in height from four to eight feet, and with scattered clumps of pine. A wiry grass grows sparsely in the white sandy soil. In general, the country lends itself well to concealment.

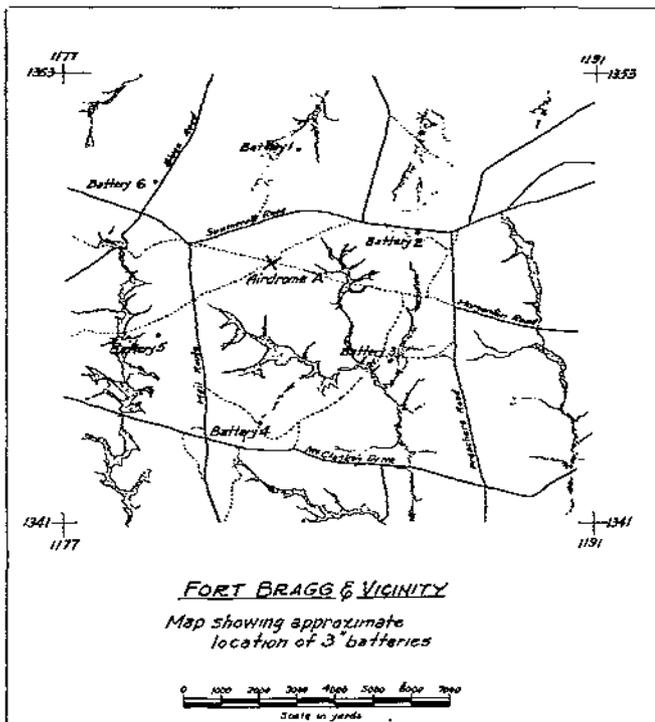
Since field artillery fires within a narrow sector at relatively low elevations, guns may be concealed under trees, in hedges, or in other positions to take advantage of natural cover and yet be able to fire in the desired direction. But in the case of antiaircraft artillery the situation is entirely different. The guns, machine guns and fire control instruments must have all-around visibility from low elevations to the vertical. Ordinarily this precludes the use of natural cover as the sole means of concealment and greatly complicates the camouflage problem.

The most important single step in concealment is the selection of a position which will permit accomplishment of the mission and at the same time afford as much aid as possible for camouflage. The guns cannot be moved into a position where no road exists without making a two-wheel track, clearly visible both photographically and visually from the air. If this track runs to the gun position and stops, the gun will be easily detected. Hence, tracks must be avoided by locating the gun just off an existing road, or by making a new road leading past the chosen position and well beyond it.

Camouflage discipline must begin as soon as routes have been chosen. All roads and paths in the vicinity of the battery must be wired in before the position is occupied. No one must be permitted to walk or drive vehicles outside of these routes at any time. If one vehicle turns around near the battery, it makes a track, visible from the air, which may give away the entire position.

Irregularity is another important factor to consider in selecting positions. Since regular shapes do not occur in

Guns arranged in regular patterns will be detected even if cleverly concealed.



nature, guns arranged in a regular pattern are likely to be detected from the air even if cleverly concealed. However, the *Coast Artillery Field Manual for Antiaircraft Defense* states that the four guns of a battery should be located on the corners of a square about fifty yards on a side. At Fort Bragg this regular formation was avoided by staggering the guns on opposite sides of an existing road, or by locating the guns at a Y road intersection. In the latter case the guns can be located on the corners of a good, but irregular, four-sided figure with each gun position close to a road so that no tracks will be made getting into position.

From the air, a 3-inch antiaircraft gun looks like a circle upon which a cross has been superimposed, because of the peculiar pattern of the gun platform and outriggers. The gun barrel and recoil mechanism is so small that it is not necessary to hide it if it is coated with a flat paint to prevent shine.

If the position is to be occupied for some time, the 3-inch gun is most simply and effectively hidden by digging in the outriggers and removing the platform. The outriggers then cast no shadow and may be completely concealed from the air by covering them with sod. It is then necessary to hide only the track made by the crew moving about the gun by erecting a flat top net. When time does not permit digging in the outriggers and the platform is left in place, the net must hide the gun platform, the outriggers and their shadows. Since this area is much larger, the problem of hiding the gun with the net is much more difficult. In either case the flat top may be garnished with natural or artificial material. Since the gun must be placed in the open, ordinarily it will be necessary to use artificial material such as burlap, hung in garlands from the net and properly painted or dyed. When sufficient natural

material is available, it should be preferred to artificial because it perfectly matches the surrounding vegetation.

Camouflaging a 3-inch battery also involves hiding the height finder, power plant and director. These are small and if painted with flat paint will not ordinarily be visible from the air. However, the crew operating the height finder and director tramples the grass. This is visible from the air as a white ring around the instrument and will give away the position. Therefore, it is ordinarily necessary to erect nets. There is a neat solution which I believe Captain H. T. Benz, Coast Artillery Corps, evolved. This involves construction of a frame built on the instrument in such a manner that the two rotate together. Slots are then cut in the net to give the necessary visibility.

Camouflage for antiaircraft artillery must be so erected that it need not be removed when going into action. This is necessary for two reasons. First, antiaircraft artillery, due to its mission, must be ready to go into action on instant notice. Time may not be available for the crew to fumble around trying to remove camouflage from the gun. Second, battery positions become visible to the enemy when the guns go into action if the camouflage must be thrown off. Hence, flat tops erected over 3-inch guns should be at the height of the trunnions and should have a hole cut in the middle through which the gun barrel projects. The gun crew then works underneath the net and nothing need be disturbed on going into action. This was done at Fort Bragg in several cases and worked very well.

At these exercises the camouflage of searchlights was not difficult. Because of the large amount of natural cover available, it was practicable to locate the searchlights on roads when they were used at night and to move them to concealed bivouacs during daylight.

The camouflage of machine guns likewise presents few problems. Due to its small size the gun itself is not visible from the air except from extremely low altitudes. Hence, any position affording a reasonable amount of natural cover for the crew is suitable for a machine gun. The weapon is portable and can easily be moved when the position becomes badly tracked. At Fort Bragg, machine guns which were dug in were camouflaged using the same principles as in the case of the 3-inch guns. Of machine-gun pits observed, all were successfully concealed, except one located in low scrub oak, about which a sandbag barricade had been erected. An attempt was made to conceal the barricade with natural foliage but so many bushes were used to hide the bags that from the air the position resembled a ring of scrub oak. The position could easily have been hidden by the use of a net suitably garnished with either artificial or natural material.

The general principles discussed above were presented to the Battery Commanders by Colonel Gillette in a conference shortly after we arrived at Fort Bragg.

The approximate locations of the six 3-inch gun batteries had been determined. (See map.) In accordance with accepted antiaircraft doctrine, batteries were located

radially about the defended area at three to five thousand yards from it. Batteries were put around Airdrome "A" at roughly 60-degree intervals. We accompanied each battery commander to his area and offered advice on how to lay out routes and select gun positions from the camouflage's point of view.

After the exact gun positions had been selected, the camouflage situation was tremendously complicated by an order to bury fire control cable, erect sandbag barricades about the guns and dig communication trenches from each gun to an ammunition pit.

Battery No. 1 (see map) was located on top of a ridge in terrain burned over about two years previously and covered with scattered scrub oak about four feet high. The one-track sand roads A, B, C and the turn-around at B (Figure 1) were already in existence when the battery moved to its position. To avoid making tracks to the gun position and widening the existing one-track road, a new one-way trail was laid out running from Summerall Road to the battery position. The distance from Summerall Road to the battery via this route was about two miles, whereas the distance as the crow flies was about 2,000 yards. Since the new road was constructed in a large bold loop it did not attract attention from the air. The road D-E was put in to make a Y road intersection so the guns could be located approximately at the corners of an irregu-

lar four-sided figure without necessitating tracks to the gun positions, except in the case of gun No. 2 which was moved in over sand and left little track. When the Y was laid out, the bend near gun No. 2 was made too sharp so that the road does not look like a natural shortcut. This road should have joined road A-B at about A.

Nets were erected over all four guns, but at the time the aerial photographs were taken the nets over guns 3 and 4 had not been completely garnished. As a result, the circular form of the ring of sandbags protecting the crew from shell fragments could be seen through the net. This is also true in the case of the machine gun shown in Figure 1. Guns 1 and 2 and the power plant were completely hidden from the air. Even with the minor defects in camouflage mentioned, S-2 of the Black Reconnaissance Squadron did not locate this battery correctly. He spotted it about 1,000 yards north of its actual position.

Battery No. 2 (Figure 2) was located on ground covered with scattered tall trees and scrub oak about six feet high. The oak was so tall and thick that it was possible to place the guns beneath it and camouflage them without nets by using natural materials. In addition, the area was covered with a network of roads and trails so it was necessary only to complete the loop from gun No. 2 to the director to gun No. 3. Instead of using sandbags to

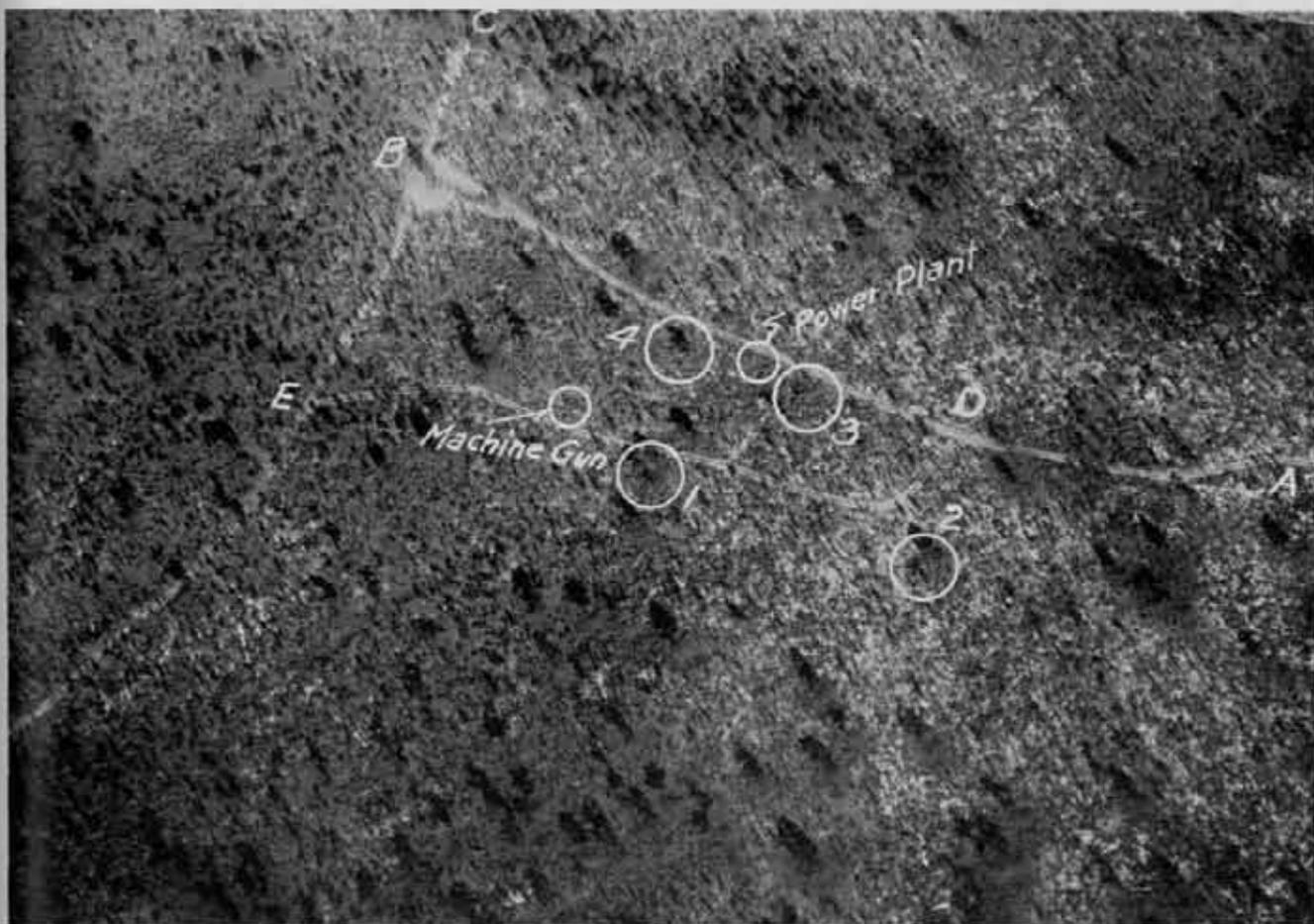


Figure 1

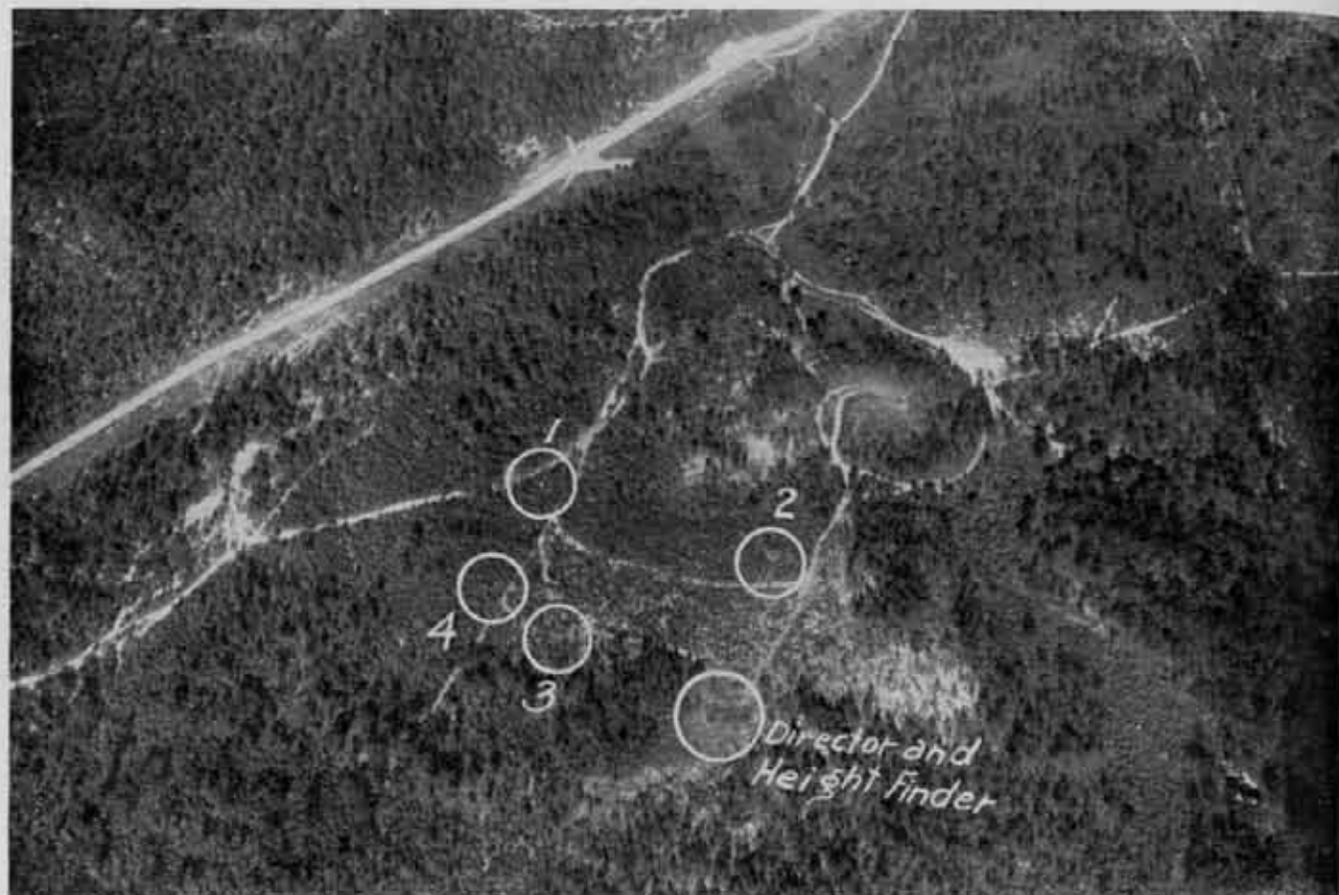


Figure 2

protect the gun crews from shell fragments, two parallel walls of pine slabs were erected about one foot apart and filled with sand. This construction resembled the four side-walls of a log cabin so it was decided to convert one of the guns and its protection into a log cabin and use no other camouflage. The gun crew let their imaginations run riot in working out this idea. Not only did they construct a roof and chimney for the cabin which could be removed when the gun went into action, but they also built a well, complete with bucket, cleared a front walk, put a dummy sandbag pig in the front yard and erected a clothesline properly adorned with wearing apparel. Since this cabin did not exist prior to the time the battery went into position and because it was necessary to remove the roof when firing, it was not sound camouflage. However, the log cabin was very popular with the press and a photograph of it was widely published in the daily newspapers.

The director for this battery was poorly hidden. The slab barricade built around the instrument was covered with a net but because of insufficient garnishing, the shape of the barricade could be seen through it.

Battery 2 was not detected by the Black reconnaissance aviation. A dummy position built about 1,000 yards away, across the main highway, was detected and photographed. Although the real position appeared on these aerial photographs, it was not located. However, Black did suspect that the dummy position was actually a dummy because the simulated guns were too apparent, resembling circles

upon which crosses had been superimposed. Had the dummy battery position been better camouflaged but still not quite well enough and had it been much farther away from the real battery position, it would have successfully misled the enemy.

It was necessary to locate the guns of battery 3 in an open field overgrown with brown grass about four feet high. Before the position was occupied a wire truck had driven into the field to point A (Figure 3), deposited the wire and driven back the same way. As a result, the field was hopelessly tracked even before the battery commander had an opportunity to lay out the roads he desired to make. Nearly all the roads shown on the photograph, except the one in the upper left-hand corner, were purposely made. Note that the Y road idea was again used so that the guns could be placed at the corners of an irregular four-sided figure without making tracks to the positions.

Although the camouflage of battery 3 was a good job considering the unfavorable terrain, the aerial photograph in Figure 3 shows violations of camouflage discipline and illustrates some poor technique. The guns themselves were carefully hidden by the use of pine trees which were cut some distance away, brought in, and wired in the desired positions. There was an excessive amount of trampling around several of the guns. Figure 3 shows this between gun 2 and the road where no path was wired. Trucks were allowed to turn around at two points on the road made between gun 1 and the director and although

an effort was made to carry this road through to join the road in the upper left-hand corner of Figure 3, there was obviously much more travel between the height finder and gun 1 than beyond the height finder. The height finder and the director themselves were carefully hidden with brush, but the tracking about them gives the effect in the aerial photograph of white circles with dark blobs in the center. The instrument trailer, which incidentally is a very hard object to camouflage, was well hidden. However, an uncamouflaged cable trench leading directly to the trailer gave away the position. The nets over the guns did not have sufficient burlap garnishing on them so that in some cases the outriggers could be seen.

The battery position was correctly located visually and was then photographed by the Black reconnaissance squadron. The camouflage could only have been corrected by converting this position into a dummy.

Battery No. 4 first moved into the position shown in Figure 4. An attempt was made to hide all the tracks by throwing leaves in the wheel ruts and sticking up scrub oak. After the guns had been put in position, the battery commander flew over them to see what camouflage errors he had made. In the words of another officer who flew at the same time, "We could only see four guns, a height finder, a director and a lot of tracks." It was therefore decided to convert this original position into a dummy and to move the battery elsewhere. This was done and the guns were very cleverly concealed as shown in Figure

4A. In the new position no loops were made but the guns were put in an L formation along one existing road. It was possible to camouflage without nets, using only natural material, because the scrub oak at this position grew about six feet tall and quite thickly.

Dummy guns were put in the old position, bogies being used to simulate the gun and brush to represent the outriggers. The dummies were skillfully made and from the air resembled poorly camouflaged guns. The use of the bogies in the dummy position was an error since it might have resulted in their destruction by enemy fire and immobilization of the battery.

We could not locate the four guns from the air, although we had previously visited the battery position and knew exactly where each gun was. We picked up one gun because the natural camouflage had wilted and was slightly different in color from the surrounding foliage. Black reconnaissance aviation thought the dummy was the actual battery position. However, since the new position was so close by, it appeared in the aerial photograph taken of the dummy. It would have been preferable to put the two positions at least two miles apart, but this was impossible because of tactical reasons.

Battery No. 5 (Figure 5) also was located in terrain covered with scrub oak about six feet high. The guns were placed two on each side of an existing road so that no new tracks were made. The camouflage itself was skillfully done, by the use of natural means except in the

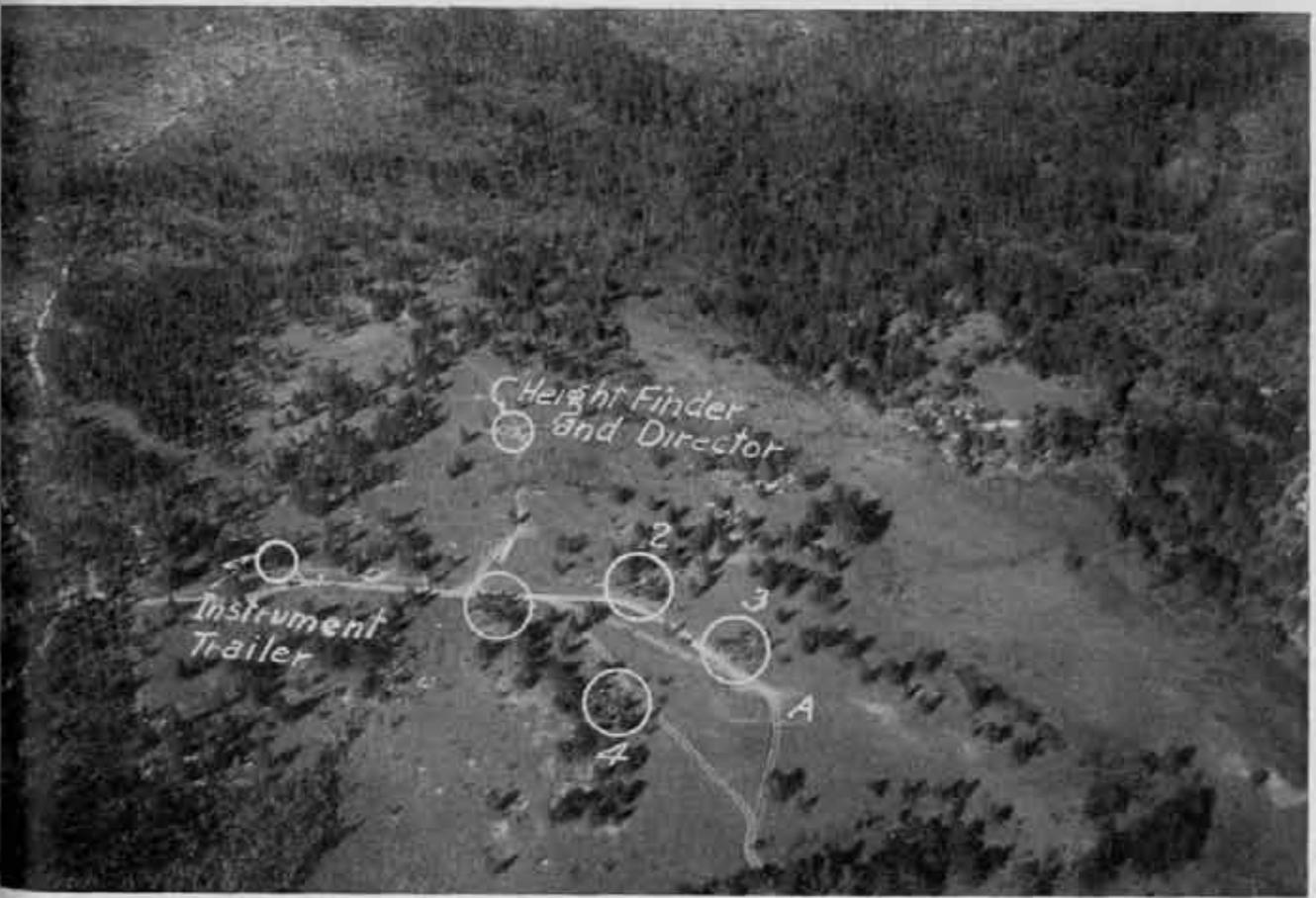


Figure 3



Figure 4

case of the director, over which a net garnished with natural material was used.

Battery 5 was successfully hidden from the Black reconnaissance aviation who incorrectly spotted it about 1,000 yards away in an abandoned searchlight position. Unfortunately, in this case too, the searchlight position was so close to the actual location of the guns that the latter appeared in the aerial photograph taken of the old searchlight tracks.

Battery 6 (Figure 6) was located in terrain less favorable for concealment than Batteries 4 or 5. The scrub oak grew only to a height of about four feet and was scattered rather thinly over the area. The entrance to the battery position was via an existing road from A to B and thence out by C. The loop from Blue's Road to the battery position and back was about a mile and a half, sufficiently large not to concentrate enemy attention on one spot and arouse suspicion. The position was further improved by the fact that the trails already existed. The guns themselves were located about the crossroads. All guns had sandbag barricades erected around them; communication trenches ran from each gun to its ammunition pit; and the cables running from each gun to the director were buried. Considering the amount of digging that was done, this battery is exceedingly well hidden. However, some errors may be detected. On careful examination, the aerial view shown in Figure 6 reveals a circle at each gun

position. This is the sandbag barricade around the gun, showing through nets not garnished with sufficient material. The condition was later corrected. It will be noted also that there has been some violation of camouflage discipline resulting in unnatural widening of the road near gun 2 and the height finder.

The power plant, mounted on a large trailer, was exceedingly well concealed. A net was erected over the entire trailer and garnished with natural material. The battery had extra cable so the trailer could be put a considerable distance from the guns. Thus a wider choice of possible locations for the plant was available and the camouflage of the battery was simplified by reducing the number of objects to be hidden in a small area.

This battery was not detected by Black reconnaissance aviation. It was incorrectly spotted about 1,500 yards away on the opposite side of Blue's Road (see map).

I visited Langley Field on the second day of the exercises proper, in order to study the methods used by the Black reconnaissance squadron to detect the 3-inch gun batteries and other antiaircraft installations at Fort Bragg. At that time the Black reconnaissance squadron, which furnished the intelligence data for the Black Air Force, had been trying to locate these batteries for about eight days with results already discussed in detail.

S-2 of the squadron had an aerial mosaic of Fort Bragg, dated September, 1938, with which to compare photo-

graphs taken during the exercises. This enabled him to detect new tracks and activity in the area. The technique was to first locate batteries approximately by visual observation of tracks or flash, and then to take stereoscopic pairs of aerial photographs of the vicinity of the suspected position. The photographs were then carefully studied by S-2 and suspected installations were pin-pricked on the small-scale mosaic or the fire control map and sent to Wing Headquarters.

When I arrived at Langley Field, S-2 had spotted the presumed locations of all six batteries plus a few searchlights. Of the battery positions only one was correct but all suspected positions were within one and a half miles or less of the actual ones. S-2 was able to come this close because he knew the location of airdrome A, the number of batteries being used in its defense, and from antiaircraft tactics the approximate distance these batteries were from the airdrome. He functioned under some handicaps. Many of the stereoscopic pairs of aerial photographs of suspected positions with which he was furnished were not taken with sufficient overlap. In addition, he, like virtually all officers, had had little previous experience in aerial photographic reading and the use of the stereoscope, nor was he familiar with the appearance of the 3-inch antiaircraft equipment. On the other hand, the Blue antiaircraft battery commanders and their personnel were inexperienced in the concealment technique. Probably an increase in skill by both the battery commanders and the S-2 of

the reconnaissance squadron would have resulted in about the same per cent of detection of antiaircraft installations as was actually the case.

It is possible that detection of the antiaircraft battery within two miles of its actual position is sufficiently close for the purposes of attack aviation because these planes can cover large areas with smoke and machine-gun fire, and if suspected positions are sufficiently close to actual ones, attacks on the former might conceivably be effective. For example, in the case of Battery No. 2, a smoke screen laid down on the dummy position actually screened the real position for a period of about twenty minutes.

Camouflage is an art rather than an exact science, and must be mastered by practice, since it is never done twice under exactly the same conditions. Although all antiaircraft personnel with whom we came in contact at Fort Bragg were interested in camouflage and realized its importance, few had more than a general knowledge of the basic principles. Since each arm is responsible for hiding itself (with technical advice from the Corps of Engineers), camouflage of antiaircraft equipment should be emphasized in training and maneuvers. During peacetime there is a natural tendency to relax camouflage discipline and training because it seems a lot of bother. However, this training will pay dividends in time of war.

The Fort Bragg exercises showed that the principles of camouflage which were evolved during the World War are still applicable. The *Engineer Field Manual*,

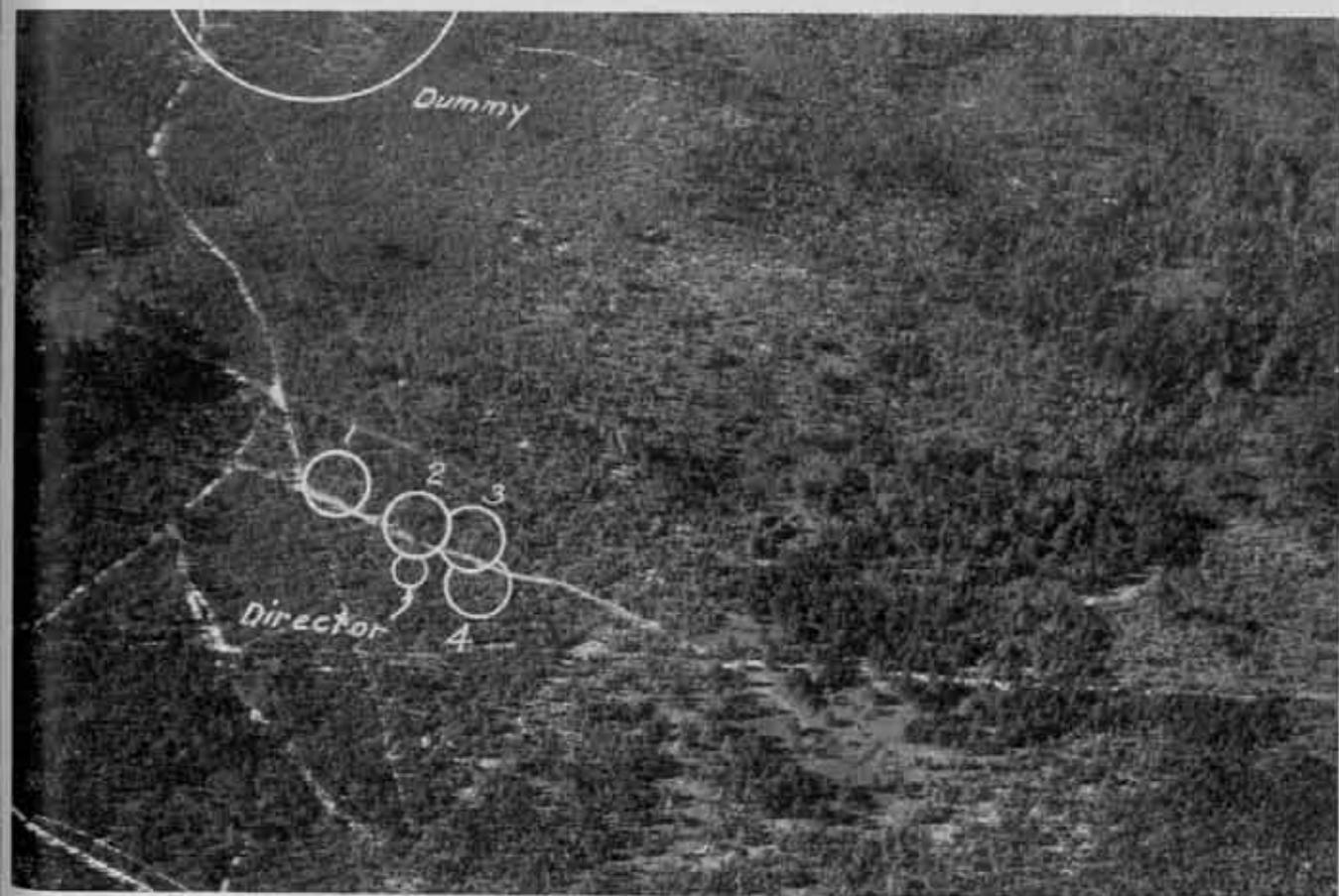


Figure 4-A

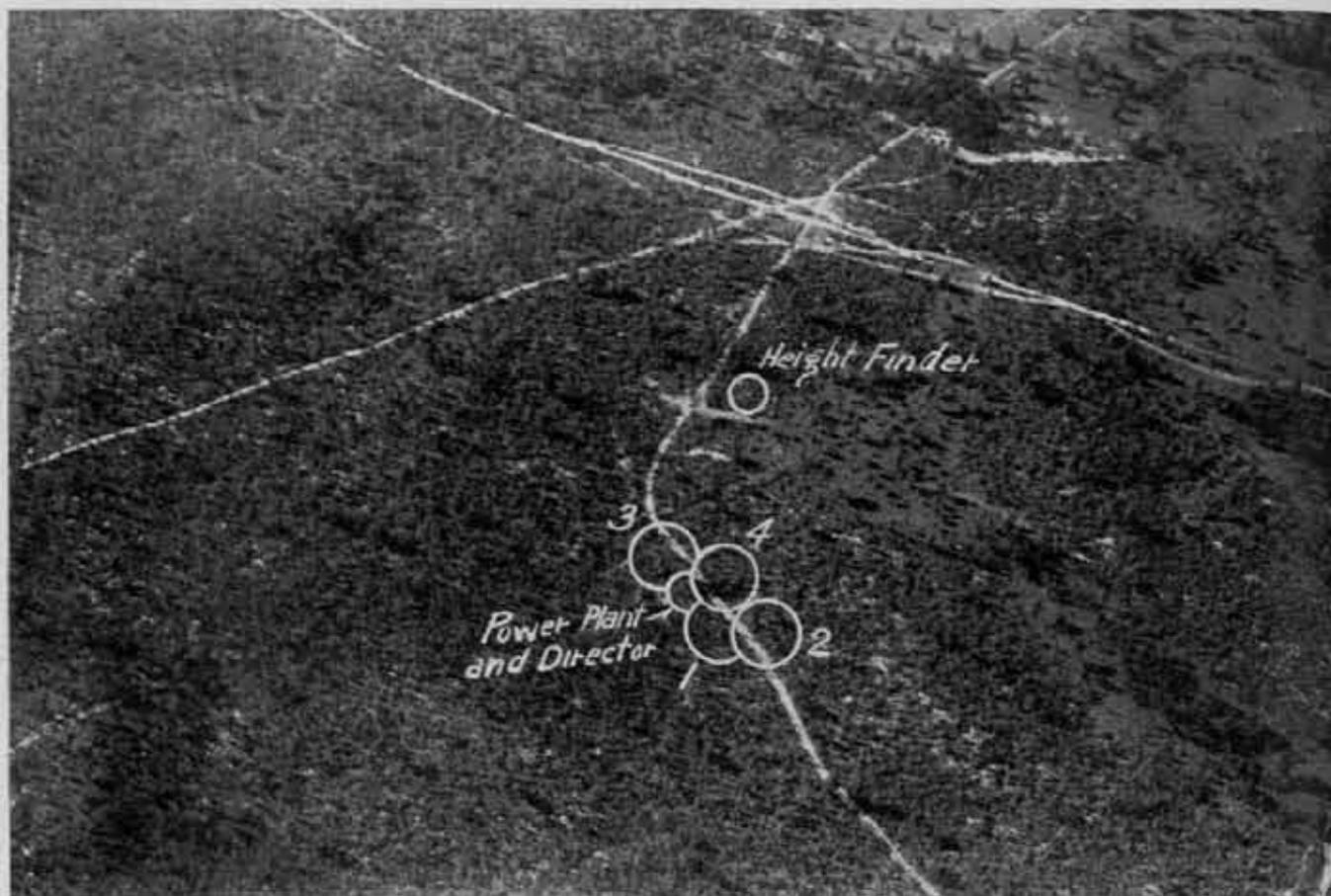


Figure 5

Vol. II, Part Two, gives the four most important camouflage requirements in the order of their importance as: proper choice of position, enforcement of camouflage discipline, proper erection of camouflage matériel, and proper choice of camouflage matériel. In virtually every instance at Fort Bragg, battery positions which could be detected from the air failed to fulfill the first two requirements. The most common fault in choosing the battery position was selecting one where there was a poor arrangement of the existing or newly-made roads. The most common violation of camouflage discipline was excessive trampling or widening of roads due to their not being properly wired in. The third principle was violated in a few cases by not having sufficient garnishing on the fishnets erected over the gun, but in no case was this error as noticeable from the air as violation of the first two principles. Choice of camouflage material made little difference at the exercises. Both natural and artificial matériel were used successfully under similar conditions.

Based on the Fort Bragg exercises, the following general principles are applicable in the camouflage of antiaircraft equipment:

1. Tracks are the single *most important* consideration in selecting the battery position. They should never run to a gun and stop, but should be carried in big loops so as not to betray the battery position as a whole. For example, a loop of 200 yards will attract attention from the air and be closely examined by the enemy because it is

unnatural. When viewed from an airplane the entire loop can be seen without shifting the eyes, whereas in the case of a loop—say of two miles—the eye will follow the road without particularly noticing the shape it takes.

2. Since antiaircraft artillery must have all-around fire at practically all elevations, it ordinarily must be put in the open where little advantage can be taken of natural cover. Hence, it should be a matter of routine to erect a flat-top net, properly garnished with natural or artificial material, over each 3-inch gun. Fire control instruments should ordinarily be similarly camouflaged. In selecting the material with which to garnish the net, it must be remembered that natural material will have to be frequently replaced and must be cut at some distance from the battery but that it is easier to use properly and will more closely resemble the surrounding terrain.

3. The 3-inch guns, fire control instruments and other battery installations should never be arranged in a regular pattern. Each battery should be arranged irregularly to fit the position and always in a different pattern. During the World War field artillery learned, and they still teach, that four guns should never be arranged in a straight line at regular intervals. If the antiaircraft guns are located on the four corners of a square fifty yards on a side, the minute the enemy locates four regular blobs, whether they look like guns or not, he will know that he has spotted an antiaircraft battery.

As much irregularity in the arrangement of battery po-

sitions as tactics permit should be sought when laying out the defense of an area.

4. Camouflage discipline must begin as soon as the battery position has been selected. All proposed paths and trails must be wired in before the battery moves into its position and guards must be placed to prevent vehicles laying wire, and command cars or reconnaissance cars from making undesired tracks. One trip by a vehicle through a position can completely ruin it.

5. Dummy positions should never be erected less than two miles from the actual gun position.

6. During exercises and maneuvers, the camouflage problem can be simplified, and a truer picture obtained of actual war conditions, if antiaircraft guns and equipment are painted with flat rather than shiny paint.

7. From a camouflage point of view, it is ordinarily impracticable to furnish protection for antiaircraft personnel against shell fragments by digging trenches and erecting sandbag barricades except where unlimited time, labor, and camouflage matériel are available. Because of the natural cover afforded by the scrub oak at Fort Bragg, excavations were hidden by distributing the soil along the roads and replacing the sod. But under ordinary conditions, it will be almost impossible to hide all these activities.

8. It is useless to practice camouflage unless the po-

sitions are photographed and studied by aerial observers because the effectiveness of camouflage cannot be judged from the ground. At Fort Bragg a flight was arranged for the battery commanders over their positions in order that they might detect camouflage errors. These flights were of great value and gave a sense of perspective which could not be secured on the ground.

Moreover, arrangements should be made with the Air Corps for proper and frequent aerial photography of guns, searchlight and machine-gun positions and for visual observation by experienced observers. Photographs should be studied and interpreted by personnel familiar with the equipment which is being hidden and experienced in photographic reading.

9. In one or two cases the work of the S-2 of the Black reconnaissance squadron was greatly helped by the large number of trucks driving around the maneuver area. The observation plane was able to follow a truck until it turned off the main highway and stopped, and then to photograph that point. In time of war the control of truck transportation to prevent its giving away the location of important installations will be a difficult problem.

10. Many of the 3-inch batteries lacked sufficient camouflage material, such as burlap and paint. Adequate supplies of such materials should be made available to the batteries for camouflage training and maneuvers.

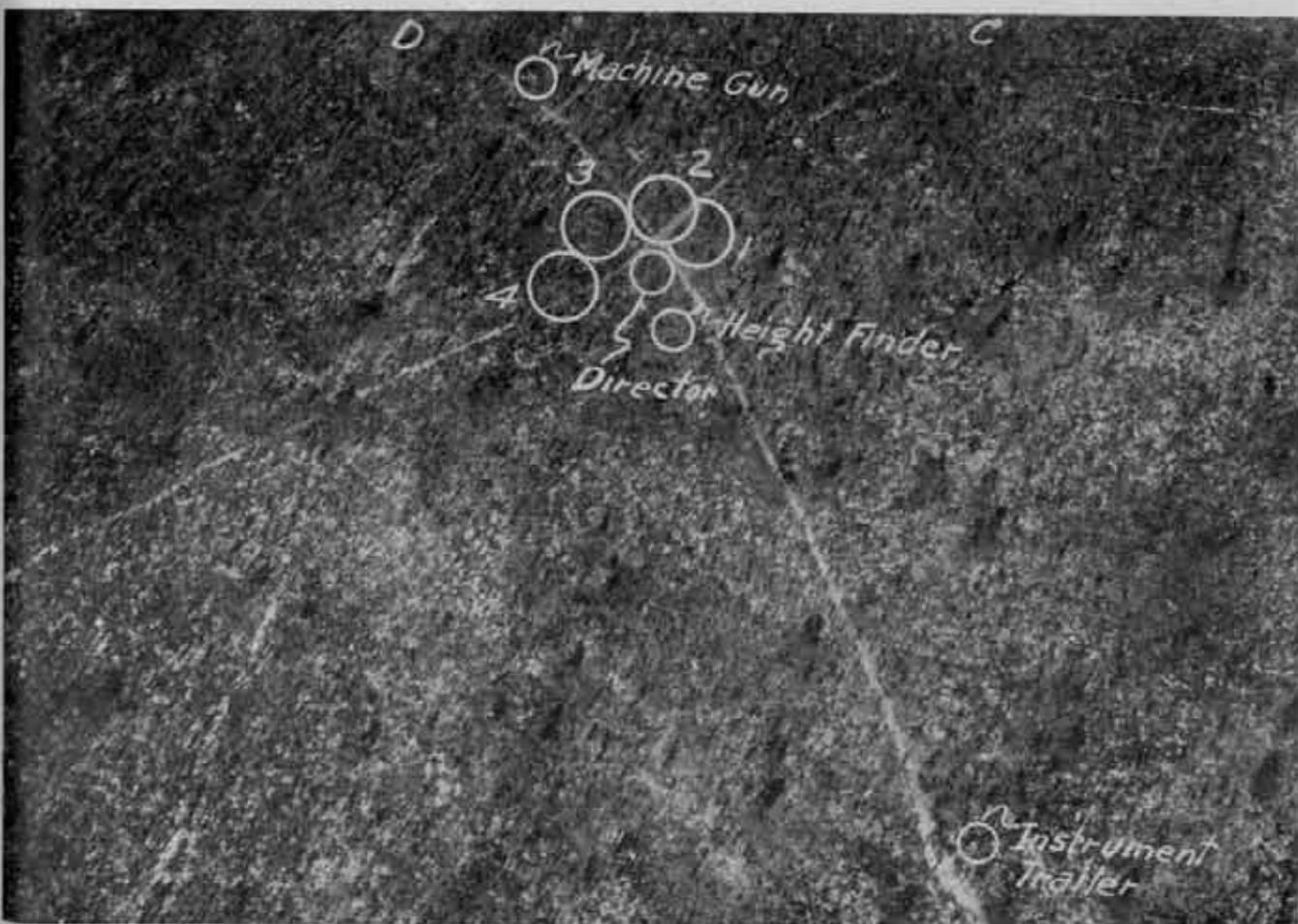


Figure 6



War in the East



The LONG ROAD TO HANKOW

By LIEUTENANT JACK W. RUDHOLP, Infantry

From the day the Japanese Army swept triumphantly into burning Nanking, Hankow has been the goal of Nipponese strategy. Provisional capital after the fall of Nanking, Hankow is the economic and military heart of China. The "Wuhan cities," of which Hankow is a part, are the junction of China's one great north-south rail line with the mighty Yangtze, spinal cord of the Middle Kingdom.

Nanking capitulated ten months ago. As this is written, the Japanese are only now entering the flaming city of Hankow. After nearly a year of astonishing resistance, the Chinese armies have been beaten back beyond the city. With Hankow captured, the Asiatic war enters its most critical phase.

CLOSING THE LUNGHAI CORRIDOR

On May 21 the Japanese Army united its northern and southern forces by occupying Suchow. Thus ended abruptly a dramatic Chinese defense which had astonished the world. The extraordinary speed of the final thrust, after five months of futile pounding, was a stunning surprise.

Since the fall of Nanking, the Japanese had been hammering vainly against both sides of the Lunghai Corridor, their desperate attacks culminating in the humiliating repulse at Taierschwang in mid-April. The first days of May found the hitherto rock-ribbed Chinese defenses apparently as impregnable as ever and Chinese defiance more shrill than at any time since the outbreak of hostilities. Within a fortnight, as this stout resistance rapidly crumbled, the flag of the Rising Sun crowned the ruins of Suchow.

Taierschwang had been an awakening shock to the Japanese High Command. Leaders of the China adventure were jolted into a realization that only a major effort could crack the stubborn resistance. The defeat was not decisive, but it burst the bubble of Japanese military invincibility. Unless a prompt and overwhelming victory were soon to follow, the backbone of the Nip-

ponese war machine and the reputations of its drivers might well be irreparably damaged.

Reaction to the defeat, the first ever inflicted upon a modern Japanese army, was immediate and violent. Relief columns stormed back upon the fateful battlefield, to be brought up short by the same Chinese tactics. Only then, it seems, did the Japanese staff come to the decision that a thrust in full strength must be made. Without further delay, it set the wheels in motion for an advance that rolled inevitably forward against all Chinese efforts to hold.

Existing forces on the flanks of the corridor were obviously too weak to gain a decision; consequently, the central front armies had to be strongly reinforced. This was a ticklish problem. The situation at home was too delicate to risk sending heavy reinforcements, and the Manchukuoan border defenses could not be touched. Other Chinese fronts must therefore be called upon to furnish the needed strength.

Garrisons in Mongolia, Shansi, Hopei, and the Yangtze Valley were pared to a minimum. These troop movements not only tipped the hand of the Japanese, robbing the projected offensive of surprise, but also weakened the positions in the reduced areas. Chinese partisans promptly swarmed in and recovered much lost ground, enthusiastically roughing the skeletonized Japanese units in the process.

A force estimated at 200,000 men, heavily augmented by every tank and gun that could be spared elsewhere, thus concentrated on the Lunghai front. Even the navy lent planes to insure an overwhelming superiority in the air. On the southern front a rehabilitated army was ready to advance, thanks to three months of intensive effort on the part of General Shunroku Hata.

Rigid censorship still denies exact information concerning the offensive, but it appears that four separate armies were formed for the knockout blow. These armies were roughly equivalent to army corps, an organization not used by the Japanese, and it is estimated that each

One thing the Chinese leader understands---Napoleon's Moscow Campaign

consisted of three divisions, strongly reinforced by tanks planes, and heavy artillery.

Three armies were poised on the northern front, while one was to advance from the south. The general plan was to continue pressure in the Taierhchwang sector, pinning down huge Chinese concentrations there, while other forces, fanning out to east and west, cut the Lunghai and closed in on Suchow from all directions. The Chinese armies, caught in the ever-tightening noose, would face surrender or annihilation. An excellent plan, barring two defects: There were not enough attackers to plug all the holes in their far-flung net; furthermore, the Chinese were fully aware of what was going on.

Before launching their attack, the Japanese indulged in a series of characteristic feints. A column suddenly struck out from Wuhu, upriver from Nanking, and pushed due west across country. Another force, estimated at about a reinforced brigade, started north above Shanghai, parallel to the coast, and approached the eastern terminus of the Lunghai. At the same time a naval demonstration captured the South China port of Amoy, apparently to keep southern forces away from the central front.

General Tushizo Nishio's First Army initiated the big push about May 8 when it forced the Hwai River and fanned out to the northwest. One column moved north along the railroad, while two others, supported by fast, mechanized units, struck across country toward the auxiliary Chinese base at Mengcheng. Moving rapidly against almost no resistance, these columns captured Mengcheng, then swung northeast and approached Suchow from west and south. A motorized engineer detachment sped north, reached the Lunghai about fifty miles west of Suchow, blew out a bridge, and effected a junction with flying detachments from the north amid a flurry of cap-tossing, *banzais*, and flag-waving.

The Second Army, led by Major General Rensuke Isogai, staged the attack on the Taierhchwang front. The left wing thrust south and cut the railroad east of Suchow while the right flank column moved on the city parallel and east of the Tsinpu Railroad. The advance of these two columns threatened to cut off the Chinese in Taierhchwang, who withdrew slowly and allowed the center column to reoccupy the battered market city.

Coming down west of the Tsinpu, the columns of the Third Army spread to the west until they established contact with the southern forces, then swung southeast to converge on Suchow. These columns met heavy resistance at the Grand Canal, but once across it, drove ahead against little opposition. General Hata was temporarily shifted from the Yangtze Valley to direct this maneuver.

Lieutenant General Kenji Doihara, famed "Lawrence of Manchuria," commanded the Fourth Army further to the west. His objectives were the Lunghai cities of Kaifeng and Kweitch, the capture of which would sever the railway and trap all Chinese forces to the east, as well as provide bases for the advance on Chengchow. Kaifeng, last large city east of the western rail junction, was particularly important. Doihara's force crossed the Yellow

River and headed for Kweitch and Lanfang, on the road to Kaifeng.

A fortnight of confusion and wild rumor followed, as existing battle lines disintegrated. An area two hundred miles square became a vast arena in which marching columns wheeled and clashed in all directions. Gradually, out of the haze of heat, dust, and conflicting press reports, emerged a general picture of some sixteen principal Japanese columns closing in on Suchow from every side while Chinese rear guards struck at them with delaying flank attacks.

On May 19 Nishio's columns seized dominating positions in the hills southwest of Suchow, brought up heavy artillery, and began to shell the city. Two days later, Japanese infantry, preceded by spitting tanks and escorted by waves of bombing planes, entered the city from all sides. It was a dramatic finale to what Japanese spokesmen were hailing as the "Tannenberg of the Far East."

The converging columns solemnly met in the middle of the city, virtually empty-handed except for the burning and deserted town. The Japanese had taken their coveted objective but had failed once more to bag the Chinese armies. They had eluded the trap before its jaws snapped shut. Actually, the net had been too widely spread to prevent most of the defenders from sifting through the gaps.

As early as May 12, according to reports, the Chinese had begun evacuation of the corridor. Some twenty divisions, including Chiang Kai-shek's personal troops, had pulled back along the Lunghai before the railroad was cut. As the Japanese closed in, General Li Tsung-jen, commanding the defending armies, left in the area a covering force of about 100,000 provincial troops with instructions to hold out as long as possible, and led the bulk of his forces southwest across country. Although suffering severely from aerial bombing, Li got out in good order and saved most of his equipment.

The rear guard, after delaying the attack as much as possible, simply melted away before it. In accordance with what appeared to be pre-arranged plans, these units discarded uniforms and retreated in small groups into the swamps to the southeast. In villages along the shores of Lake Hungtze they refitted as partisan troops for an intense guerilla campaign behind the Japanese lines. Thus it is estimated that more than 100,000 guerillas now roam Shantung, harassing the invaders with ever-increasing effect.

The capture of Suchow joined the northern and southern Japanese armies, gave them control of an important lateral railroad over which they could shuttle troops and supplies, and secured a strategic base for a westward push against Chengchow. At the same time, the lack of a supreme commander in China led to a considerable dispersion of effort. Foreign observers and correspondents attribute this to jealousy among the Japanese leaders, particularly between Terauchi and Hata.

On the other hand, the loss of Suchow did not seriously

alter the Chinese situation. In the first days of the campaign, its early fall was generally expected; the city only gained an undue value in the eyes of the world because of the protracted stalemate. Actually, the Chinese still retained uninterrupted their main supply routes and had, besides, achieved remarkable success in forcing Japan to squander men and supplies on an objective of secondary importance. Suchow was a great diversion, nothing more.

Three hundred miles west of Suchow and half that distance beyond Kaifeng, the pivotal city of Chengchow remained in Chinese hands. Securely guarded on the north by the Yellow River, Chengchow is the junction of the Peiping-Hankow and Lunghai Railroads, over which long trainloads of Russian planes, artillery, and munitions crawled from Mongolia to Hankow. Capture of Chengchow would sever this artery and place the Japanese in a favorable position to strike at Hankow from the north.

Chengchow became the immediate goal of the exultant Japanese army, rushing westward in headlong pursuit. The Chinese made little effort to stop the pursuit on the west of Kaifeng, allowing the Nipponese to penetrate the very outskirts of Chengchow. Japanese tanks, in fact, were ramming at the city's very gates before the world learned the real reason for the retreat.

"JAPAN'S SORROW"

One of the longest rivers in the world and the most dangerous natural force in China is the Yellow River. From headwaters far back in the remote hills of Mongolia this mighty stream sweeps in a wide arc to the south and east, forming a great strategic barrier between north and central China. South of the Great Wall, where it emerges from the tumbled hills of the northwest, the river bends sharply to the east and races across the flat plains of Honan and Shantung to the sea.

For half its length, the Yellow River cuts its channel through the loess hills of western China, a peculiar, easily eroded soil formation from which the river derives its color and its name. It carries down from the hills a tremendous amount of powdery silt, and sometimes its precipitation content registers as high as forty per cent of dirty, yellow mud.

Moving across the eastern prairies, the stream is held within banks by a system of huge dikes, erected by neighboring peasants through the centuries. Deposits of silt on the river bed have caused a gradual filling of this man-made channel so that the whole stream has been lifted up. The Chinese periodically meet new rises with higher dikes, until today an immense and picturesque trough guides the river across the surrounding country, which is sometimes thirty feet below the water level.

For untold centuries the Yellow River has scourged the flatlands on its flanks with devastating floods. Annually, during the early summer months, melting snow and rain from the hill country swell the stream to dangerous size. If the levees do not give way, the river remains under control but perilously high for several weeks, until the

heavy rains of July and August transform it into a raging, yellow torrent. Fourteen times in recorded history the imperfectly tamed dragon of the north has jumped its banks and changed course, the last time in 1853, when it broke the dikes north of Kaifeng and departed on its present path to the sea in a tremendous leap of 250 miles, leaving in its wake one of the most catastrophic inundations of modern times.

Centuries of living in the shadow of disaster have endowed the Honanese farmers with a philosophic attachment for their treacherous neighbor. To them the river is the abode of vicious but generally friendly dragons, who only visit their wrath upon the countryside in moments of justifiable anger. That fury the Chinese were about to unleash upon their enemies.

Having overrun Suchow, the Japanese did not repeat their Nanking mistake. Allowing the retreating armies no chance to stop and consolidate a defense, they pressed their pursuit with extreme vigor. The level Honan country was ideal terrain for mechanized units, which ranged far and wide on the trail of the Chinese. For their part, the Chinese made slight effort to stand on ground over which the Japanese could utilize superior equipment to full advantage.

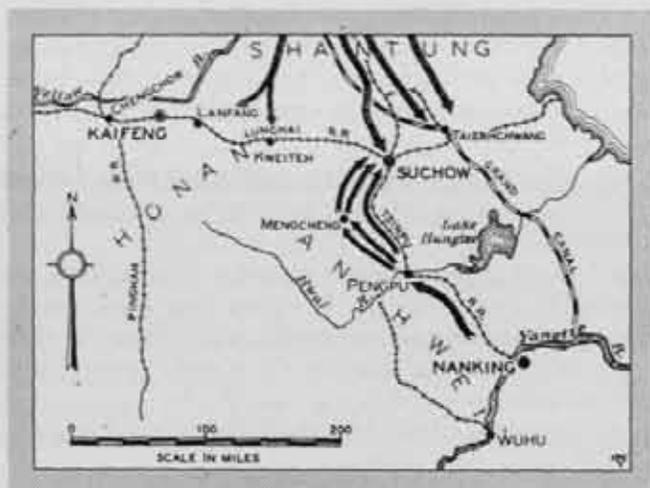
The retreat, however, was anything but a repetition of the Shanghai aftermath. During the first week in June the Chinese turned on their pursuers at Lanfang, south of the Yellow River, and almost repeated the débâcle of Taierhchwang. Coincidentally, their near victims were the same people.

In this triumphant dash from the river to the railroad, General Doihara let his enthusiasm get the better of his communications. The general and one brigade of his crack 14th Division, which had been badly mauled at Taierhchwang, outdistanced their supports and were trapped by a sudden counter-attack at Lanfang. Backed against the river and almost surrounded, the brigade fought off annihilation until relief forces crossed and rescued the remnants. The toothy General Doihara was promptly ordered back to Japan.

Failing to liquidate the hated Doihara, the Chinese fell back rapidly, giving up Kweiteh and Kaifeng. Even Chengchow was virtually undefended as the main Chinese forces retired down the Pinghan to mountain positions south of the city. The Japanese took the bait and stormed within artillery range of the important rail center. Then, with lightning decision, the Chinese trap was sprung.

Without warning the Yellow River dikes between Kaifeng and Chengchow buckled. Swollen by the spring overflow and days of torrential rain, a muddy, yellow wave poured through great breaches in the levees and spread across the Japanese communications, swallowing everything in its path. Within a few days, hundreds of square miles of fertile farmlands were buried under a great natural barrier, varying in depth from five to twenty feet.

Caught in flank, the unwary Japanese were engulfed in the fury of the water dragons. Desperate efforts to reach and repair the dikes were stopped dead by Chinese ma-



The Shantung Campaign.

chine guns. The shaken army streamed back toward Kaifeng. Gone were the powerful, high-speed tanks and mechanized artillery that had accompanied the advance. Bogged down and useless, this equipment was abandoned as the army groped its way back to dry land in rude boats, rafts, and anything else that would float. Loss of life among the trapped units probably did not exceed five thousand, but estimates of lost equipment and artillery run as high as sixty per cent, a staggering loss not easy to replace.

Some Japanese units were caught beyond the flood waters and soon wiped out. Most of them escaped, however, using the high embankment of the railroad and any buoyant equipment they could appropriate. The evacuation was made all the more difficult by the necessity of rescuing thousands of civilians likewise caught in the deluge.

Lightly equipped and now more mobile, Chinese troops swarmed after the retiring invaders, harassing the retreat and salvaging what they could of abandoned equipment. The Japanese eventually pulled all the way back to Kaifeng, which was itself only saved from inundation by breaching the railway embankment and relieving pressure on the city's flood defenses.

Promptly Japan charged the Chinese with deliberately mining the dikes and destroying hundreds of thousands of their own people to stop the advance. Chinese denials, in turn, placed responsibility on the invaders, whose alleged bombing attacks not only interrupted vital repair work on the levees but weakened the barriers. Still other sources credited neighboring farmers with blowing up the dikes themselves, more willing to destroy their homes than to live under the military rule of the invader.

The Japanese charges were undoubtedly correct, although their own activities may have helped. If Chinese farmers did the work, they were certainly aided by the Chinese army. Reports of widespread fatalities among the population may be largely discounted, however. Most of the millions of natives had fled westward before the tide of war, and those remaining had been warned that if

necessary the dikes would go. Estimates of 150,000 dead appear too high.

The greatest danger to the peasants was not drowning but starvation. Except near the river the flood level did not exceed a few feet, but the heavy precipitate of silt buried everything under a thick layer of ooze. With crops and food supplies completely covered, marooned peasants were forced to eat the bark of trees until rescued.

Even this destruction was an indirect aid to the defense, for the destitute refugees became liabilities of the invaders, who were forced to feed and care for the thousands streaming into their lines—refugees apt at the first opportunity to bite the hand that fed them. As Major O. J. Todd, veteran Yellow River flood-control engineer, wrote in the *New York Times*, the Yellow River had become "Japan's Sorrow."

Flooding the Honan plain, though it entailed an enormous destruction of property and raised the grim specter of famine, nevertheless effectively relieved the northern threat to Hankow for months to come. It cost heavily in lives and crops. But the crops will grow again, more luxuriantly than ever, and life is cheap in China, ancient witness of the destruction of many times 150,000 people in years of hunger, flood, or plague. From the Chinese viewpoint, blasting the dikes was worth the price.

Baffled in their drive against the northern supply system, the Japanese turned their attention to other fields. Although the rising guerilla menace in the north was assuming dangerous proportions, the strategists of Tokyo clung to Hankow as their true goal. Only one road, a path presenting tremendous natural obstacles, remained open for an advance against the seat of Chinese government, nerve center of its resistance. The axis of operations returned to the Yangtze Valley.

TO HANKOW

Five hundred miles longer than the murderous Hwang Ho, and even vaster in breadth and depth, the Yangtze-kiang rolls across the great, central plain of China for 3,200 miles from the Tibetan highlands to the wharves of Shanghai. For uncounted centuries the placid Yangtze, navigable by ocean vessels for a third of its length, has been the spinal cord of China.

Its fertile valley is the richest agricultural region in China and the finest rice country in the world, but these swampy marshlands remain virtually untouched by the refinements of western civilization. Beyond the broad bosom of the river, transport is still as primitive as in the days of Confucius. Roads are practically non-existent, and the steaming valley has never heard the whistle of the Iron Horse. Wandering footpaths—muddy rivulets in rainy weather and deep-rutted trails choked with dust in dry—meander through the squat hills and skirt innumerable marshy lakes.

On the flat and sweltering river bottom where the river Han flows into the Yangtze 650 miles from the sea, three great cities sprawl behind the protecting ramparts of en-

circling mountains. The "Wuhan cities"—Wuchang, Hanyang, Hankow—with a joint population of a million and a half, are known as the "Chicago of China," and are considered the most vital strategic center of Nationalist China's remnants.

Hankow, on the north bank of the Yangtze, is the largest of the three. Important before the war as a commercial rival to Shanghai, it is the great rail center in the interior. After the fall of Nanking, Hankow became the temporary capital of the Central Government and the nerve center of Chiang Kai-shek's supply system. In the southeast corner of the river junction lies Wuchang, capital of Hupeh Province. The third city, Hanyang, is strategically valuable for its steel mills, powder mill, and government arsenal. With the fall of Suchow, this triple city, encompassing an area the size of Brooklyn, Manhattan, and Jersey City, became the objective of the Japanese armies.

After the ochre tide of the Yellow River swept over the northern battle front, the Yangtze Valley became the only feasible approach to the Wuhan cities. Shifting their axis of advance to the south once more, the Japanese pulled troops out of the Lunghai and shipped them upriver to Wuhu, farthest point reached in the conquest of Nanking.

During the first week in June, before the full extent of the watery débâcle in the north was suspected, Japanese destroyers operating out of Wuhu had raided Chinese positions up the river. On June 13, the Hankow drive got off auspiciously when fifty warships and transports descended upon Anking, capital of Anhwei Province. Under cover of thick fog and naval gunfire, troops landed and drove the surprised defenders from the city. In one river dash the invaders had shortened by fifty miles the long road to Hankow.

Twenty thousand men and nearly a hundred vessels concentrated at Anking, which now became the base for a double-barreled advance against the next defensive position. In a joint land and water operation, a strong column moved across country to outflank the Chinese while the main flotilla pushed directly upriver.

The land force never got more than fifty miles beyond Anking. In a roadless labyrinth of lakes and spongy rice paddies the mechanized Japanese became hopelessly stuck. Harassing flank attacks brought the wading march to an abrupt halt. Meanwhile, the naval contingent edged slowly up the river through furious cross machine-gun fire from both banks.

At Matang, seventy-five miles beyond Anking, the Chinese had blocked the channel with a sunken boom of stone-laden junks, timber, and concrete. Strategically placed machine-gun nests and batteries of artillery were sited to sweep the open water below the barrier. Until this boom was breached the way to Hankow was barred.

The day after the fall of Anking, Japanese bombers began to blast a channel through the barrier. While the planes hailed heavy bombs upon the boom and its defenses, the naval flotilla advanced slowly and carefully



First Stage of the Hankow Campaign.

behind a screen of mine sweepers, shelling the river banks as it went. On June 24 the fleet arrived below Matang and made a spirited attempt to cross, but was promptly driven back by the guns of the Matang forts.

Japanese troops landed on both sides of the Yangtze about twenty miles below Matang and initiated turning movements against both flanks of the position. For eight days bloody fighting raged among the tall rushes of the river bottoms, in which both sides suffered heavily. The Chinese admitted 10,000 casualties and claimed that their bombing raids had inflicted tremendous damage among the ships massed below the boom.

Extensive air raids by both armies precipitated the most spectacular aerial fighting of the war. Hankow communiqués lauded the Chinese flyer who plummeted his blazing, bomb-laden plane through the deck of a Japanese destroyer and perished in the destruction of the vessel. Japanese dispatches reported a daring raid on the Nanchang air base, in which a Japanese squadron landed, set fire to grounded planes, and escaped through a curtain of anti-aircraft fire. Massed air fleets clashed above Nanchang, the Wuhan cities, and over the stalled Japanese warships.

Gradually the defenders gave ground before increased pressure and intensive bombing from the air. Ironically, China's hitherto infallible ally, the weather, forced the evacuation of the Matang forts. Heavy rains, which had converted the semi-tropical valley into a stinking swamp and seriously handicapped land operations, raised the river enough to float the Japanese vessels over the sunken barrier. On July 2 a transport negotiated the boom, ran a gantlet of machine-gun fire, and landed troops behind the Chinese lines. This feat broke the back of the defense and necessitated a general withdrawal.

Three days later the advance guard occupied the city of Hukow, key to the mouth of the Lake Poyang, second largest

lake in China. Across the lake mouth the famous pottery center of Kiukiang, only fifteen miles away, became the next objective. Possession of Kiukiang was necessary for complete control of the lake outlet.

At Kiukiang, the Yangtze, sweeping between high narrow banks, is divided in midstream by a precipitous island, site of an ancient monastery. Among its craggy ruins and in the flanking palisades, the Chinese emplaced heavy artillery with a clean sweep of the swiftly flowing river. Sunken boats and floating mines dotted the fire-swept channel. Inland, the river heights fall away into a morass of swampy rice paddies and jumbled hills, ideal protection against flanking columns. To strengthen the position, the Yangtze was approaching flood stage, and pouring through the gorge at a rate of more than twenty miles an hour.

Before these rugged obstacles the advance halted for three weeks. Stifling heat closed down upon the panting armies and exhausted them in 110-degree temperatures, while clouds of mosquitos swarmed out of the nauseous swamps, bringing disease and death into the sweltering ranks. Although their forces were augmented by a reported 5,000 men a day, the Japanese infantry was unable to dent the defenses. Inaccuracy of Chinese artillery finally lost the position when it failed to keep the lightly armored gunboats at a distance.

On July 26 the gunboats ran the fire of the heavily bombed forts, while foot troops secured a slender foothold on the south bank. North of the river a sudden thrust circled the defenses and reached Hwangmei, thirty miles northwest of Kiukiang. Though forced to abandon Kiukiang, the Chinese cut the dikes above Hwangmei and effectively stopped the overland attack.

Beyond the city proper, the attack met stubborn resistance. Anticipating a drive on Nanchang, one hundred miles to the south and important as a jumping-off place for a thrust toward Changsha, the Chinese concentrated more than thirteen fresh divisions and a mobile reserve of 120,000 men south of Kiukiang. Against this force, entrenched in a tangled mass of rolling hills, rice fields, and swamps, a Japanese column of 60,000 attempted to push south along the Kiukiang-Nanchang branch railroad. Under cover of naval guns the advance penetrated about ten miles and then came to a standstill, where it stayed throughout the month of August.

Kiukiang fell on July 26, and then became the advance base for operating against the main defenses of the Wuhan cities, stretching in a mountainous half-circle on a hundred-mile radius from the capital. Into an elaborate trench system, knitting the maze of lakes, swamps, and serrated hills into a formidable barrier, Chiang Kai-shek poured nearly a million men. While Li Tsung-jen and his Kwangsi troops guarded the northern approaches, General Chen Cheng assumed command of the river defenses, where replenished regular divisions, strong with veterans of Shanghai and Suchow, moved into the line.

After the Japanese occupation of Kiukiang, the advance split. Half the force continued pressure up the river while

the other half turned south and attempted to penetrate down the railroad to Nanchang in the first step of a movement to outflank Hankow from the south. A third column, with mission to act as a flanking threat for both main movements, struck across country toward the strategic city of Juichang, twenty miles southwest of Kiukiang. From Juichang one of the extremely few and poor highways in the area cut diagonally from Matowchen to Teian on the Nanchang railroad. Matowchen, guarding one end of a boom across the Yantze to Wusueh on the north bank, was the next objective of the river drive, while Teian was the gateway to Nanchang.

In the Hankow-Nanchang-Changsha triangle nearly 300,000 veterans had concentrated to balk the movement against the capital's southern artery. Over difficult terrain, defended by the best troops in the Chinese army, 60,000 Japanese tried to execute a double envelopment against Teian, fifty miles north of Nanchang. While the Juichang column threatened the Chinese left and the center force maintained direct pressure, another force approached by water.

The center attack rolled slowly forward for about ten miles, then halted abruptly. The lake force landed at Singtze, on the west shore of Lake Poyang, in an attempt to turn the right flank, but it was pinned against the shore by repeated counter-attacks and got nowhere. The right column pushed slowly ahead toward Juichang in the face of increasing resistance.

Temporary cessation of summer rains again brought a period of terrific, sultry heat to the sodden valley. Panting in temperatures that hung about 100 degrees, the sweltering armies were struck by epidemics of cholera, malaria, and dysentery—scourges more deadly than machine-gun fire. Chinese sources claimed that forty per cent of the Japanese army was incapacitated, while the latter admitted a sick list of ten per cent. Conditions among the Chinese must have been appalling.

Through the withering heat of August, beset by mosquitos and disease, the antagonists locked in the bloodiest struggle of the year-old war. Slowly, beaten back under a steady rain of artillery and air bombardment that reduced villages and defenses to fire-gutted heaps of rubble, the Chinese gave way, extracting a heavy price for every foot of ground. Juichang they finally abandoned on August 26, after a month of bitter resistance in heat that rose as high as 140 degrees. Beyond the city, however, the advance stopped in its tracks.

Unable to progress west of Lake Poyang, the attackers landed east of the lake and attempted to fight their way around the southern tip. They were thwarted by alert resistance and impossible terrain. After a month of desperate fighting the Nanchang attack stalled seventy miles short of its objective and barely thirty miles from its line of departure.

By the end of August it was evident that the danger of war with Russia had been averted for the moment. In a desperate bid for a decisive victory, before winter or the Soviet further complicated the situation, the Japanese

turned once more toward Hankow. Despite unfavorable weather and terrain they once more opened a large-scale offensive up the Yangtze, coordinated with extensive operations on both flanks. Three hundred thousand men struck on a divided front, with spearheads more than a hundred miles apart.

General Headquarters moved from Shanghai to Nanking, departing in a fanfare of official optimism that predicted October 1 as the deadline for the capture of Hankow. To record the historic occasion, a corps of nearly three hundred Japanese photographers, reporters, and radiomen moved to the front, prepared to cover "The Epic of the Yangtze" when the Nipponese juggernaut thundered into the Chinese capital.

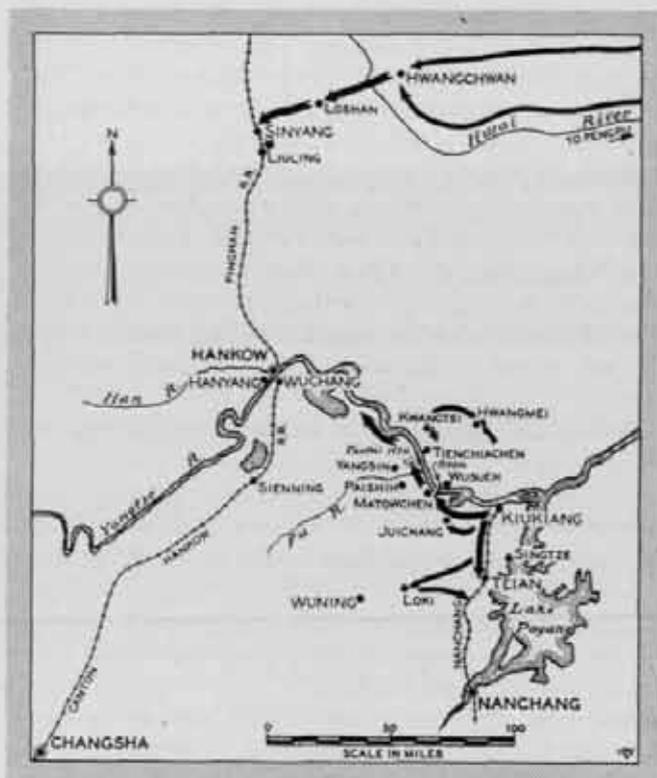
During the last week of August the offensive was launched, up the Yangtze, through mountainous country below the river, and across the plains of Anhwei and southern Honan, 125 miles north of the river. While the center wedged its way through the strong river defenses, the flanking movements aimed at the railroads above and below Hankow in twin efforts to isolate the Wuhan cities by severing their north and south communications.

In the river valley, approximately 100,000 men converged on both flanks of the Matowchen-Wusueh barrier. Columns penetrated north from Juichang against Matowchen while the naval flotilla edged upriver and bombarded the forts. The air service raked the defenses as far back as the Wuhan cities, subjecting not only Hankow but the entire area to a series of devastating raids. The decimated Chinese air force offered feeble resistance and was quickly driven from the air.

North of the river the advance, held up since the middle of August by flood waters beyond Hwangmei, sidestepped to the north and solid ground and proceeded toward Kwangtsi, the capture of which would threaten the rear of Wusueh's defenders and force a withdrawal from the north end of the river obstacle. A long and bitter struggle developed in the rugged country around Kwangtsi before exhausted Chinese units were forced to evacuate the town.

Kwangtsi was captured on September 12, turning the Wusueh position. Matowchen fell three days later before a combined land, air, and naval assault. By the 17th the boom was entirely in Japanese hands. A surprise counter-thrust on September 23 trapped the Japanese in Kwangtsi, but this threat was smashed. The Japanese, according to press reports, employed a CN-DM¹ type of chemical agent against the attack, incapacitating the Chinese for several hours, long enough to effect a relief. Deadly concentrations were not used.

Ten miles above the Matowchen position the defenders had constructed the last strong barrier before Hankow, across a precipitous narrows between Panpai Mountain and Tienchiachen. This position was overrun after a swift operation of only two weeks, leaving the way virtually free of natural obstacles for the final leg of the drive. The success of this attack, through difficult country and against



Latter Stage of the Hankow Campaign.

highly organized defenses in the hands of desperate troops, suggests a further use of gas, a weapon against which the Chinese had neither physical nor moral armor. By the middle of October the advance had rolled upstream in the face of Chiang Kai-shek's personal troops to within seventy-five miles of its goal.

On the south flank, columns spreading out from Juichang moved toward Yangsin, seventy-five miles southeast of the Wuhan cities and key to the Wuhan highway; toward Sienning, railroad town sixty miles south of Hankow; and toward other southwesterly points. The Yangsin highway route was a particularly difficult one, leading through a continuous series of hills and lakes, some of which flanked the road on both sides for miles. One column, cut off in these hills, was routed with heavy casualties. Early in October, however, the Fu River was crossed and the town of Paishih captured, opening the way for an attack on Yangsin. At this writing, Yangsin has not yet been occupied.

Farther south a strong column captured Loki, placing the Japanese in a favorable position to drive on Wuning to the west and then straight toward the Canton-Hankow Railroad over adequate highways. Instead of pushing westward, however, the Japanese made a sudden thrust to the east. A Shanghai dispatch, dated October 8, stated that this column had reached the Nanchang-Kiukiang railroad sixteen miles below Teian, cutting off twenty divisions in the Teian area. Subsequent Chinese reports of a crushing counter-attack have not been confirmed.

The northern phase, although less publicized than the valley fighting, was highly important, both in possibilities

¹ CN=Chloracetophene, a lacrimator.
DM=Adamsite, a lung irritant.

and results. A mechanized army of 100,000, commanded by General Prince Naruhiko, son-in-law of the late Emperor Meiji and member of the Supreme War Council, rolled across Anhwei and Honan in a wide circling movement north of Hankow, aiming at the Pinghan Railroad far above the city. Two main columns advanced west, one striking overland while the other made a fast ascent of the Hwai River from Pengpu. Both converged on Hwangchwan, gateway to southern Honan, the river expedition arriving after covering 240 miles in ten days. The advance then turned west and pushed steadily toward the rail center of Sinyang, 100 miles north of Hankow.

At Loshan, only thirty miles from its objective, the attack bogged down before cloudbursts, knee-deep mud, and Li Tsung-jen. For two weeks the opposing forces fought in a sticky quagmire, then the badly mired Japanese had recourse to mounted cavalry to break the deadlock. A horse column made a dash for the railroad, which it reached at Liuling, eight miles south of Sinyang. At the time of writing, conflicting reports obscured this situation on the northern flank.

Although considerably behind schedule, the Yangtze drive has been everywhere successful. The center of the Hankow ring has been pierced, the north flank turned, and the south wing pressed slowly but steadily back. This rendered the city untenable. Evacuated by the Chinese Army, abandoned by the civil government, it was finally captured on October 25.

A new element was suddenly injected into the conflict on October 13, when a force, estimated at between 35,000 and 50,000 men, landed at Bias Bay, twenty miles northeast of the British colony of Hong Kong, and advanced with amazing speed on Canton with the object of severing the southern supply route at its base. Canton soon fell.

ORIENTAL HIT-AND-RUN

As the Japanese war machine bored its way deeper into the heart of China, events in other theaters of the war pointed toward the future course of Chinese resistance. Obscured by the more spectacular Yangtze campaign, but none the less effective, guerilla tactics were achieving increasing results throughout the Japanese occupied areas. Nowhere was guerilla warfare more successful than in the area longest in Japanese hands—north of the Yellow River, where the Reds themselves were directing the resistance.

When the former Red Army, reorganized and redesignated as the Eighth Route Army, crossed into Shansi in the early weeks of the war, civil and military resistance had crumbled before the Japanese advance. The Reds at once took up the task of reorganizing the provinces of Shansi and Hopei, employing the partisan tactics so successfully developed during a decade of civil war with Chiang Kai-shek.

Civil authority was restored and allied to the Central Government through a highly efficient radio network. The entire population was enlisted for the struggle and

fired for continued resistance by an intense anti-Japanese propaganda campaign, directed by experienced Red propagandists. Taxes were equitably levied and collected, while war industries were established to supply the expanding guerilla armies. Crops were planted, cooperative marketing introduced, and banks established. Some aid, but not much, was forthcoming from Hankow.

All physically qualified men were called to arms, equipped, and trained for guerilla warfare. Local defense groups, home guards, and mobile battalions were trained in the tactics of the Eighth Army. Efficient staff work gave these forces remarkable coordination. A highly organized spy system, employing mostly women and children, enabled the partisans to concentrate against weak points along the thin Japanese lines, strike, and disperse before help could reach the isolated victims. Likewise, advance knowledge of Japanese movements nullified plans to surprise the guerillas.

As their strength increased the guerillas became bolder. Small-scale attacks on outposts and small convoys expanded into large-scale operations against walled cities. Bridges and supply depots were dynamited, and a reign of terror instituted among Chinese who helped the invaders.

The attacks on cities were not generally successful, because the guerillas lacked supporting arms, but they forced the Japanese to divert badly needed troops to garrison duty. Repair crews labored unceasingly to maintain precarious communications. The wave of political murders was so effective that few Chinese would cooperate with the Nipponese.

Reinforcements necessary to combat such tactics were denied the Japanese just when they were most needed. North China was heavily taxed for men to aid the Suchow, Changkufeng, and Yangtze operations, leaving a skeletonized army of occupation to face the rising tide of opposition. This outnumbered and thinly spread force was barely able to maintain itself in the principal cities and along the railroads. Beyond the range of its guns it was utterly impotent.

An American Marine Corps officer, Captain Evans F. Carlson, made two inspection tours of these areas, visiting the Eighth Route Army and observing its operations. Upon his return to Hankow, he told the *New York Times* correspondent, F. T. Durdin, that he had several times crossed Japanese railroads with mobile units, that the area controlled by the Japanese did not extend more than four miles on either side of these railroads, and that Chinese authority in the occupied zones was actually stronger than before the war.

Harassed incessantly by an enemy they could neither see nor catch, the Japanese were restricted to the main rail lines, highways, and principal cities. Even there, sleepless vigilance was the price of security. Trains and convoys moved under heavy guard and then only in daylight. Railroad stations and dépôts were sandbagged and wired until they were virtually impregnable strong

points. Large-scale troop movements collapsed in the wreckage of shattered supply lines.

A report issued by General Chu Teh, commander of the Eighth Route Army, claimed the lives of 34,000 Japanese in battles with partisans from September, 1937, until May, 1938. Allowing for exaggeration, the true figure must be somewhere near 25,000. Dr. Walter H. Judd, American missionary, told of divisions whose effective strength was whittled by two-thirds in a few months' time without ever fighting a battle.

Guerilla warfare flared up in Manchukuo, threatened to undo seven years of efforts by the Kwantung Army to pacify the country. Associated Press reports told of mysterious fires and explosions in Mukden, Harbin, and Tsitsihar, which wrecked power plants and mills, with the destruction of hundreds of thousands of dollars worth of oil, munitions, and clothing supplies.

Confined originally to North China, partisan tactics eventually spread to every zone occupied by the Japanese. The Red tactics were opposed by the Kuomintang and the Kwangsi generals, Li Tsung-jen and Pai Chung-hsi, but after the fall of Nanking the Communists succeeded in increasing their range. Communist organizers filtered into Shantung after the Lunghai Corridor was wiped out, shortly unleashing swarms of guerillas throughout the area. The Central Government now adopted the Red system; sending out its own organizers to prepare areas not yet reached by the Japanese. In the Hangchow-Shanghai-Nanking triangle, partisans periodically raided Shanghai itself.

A situation map maintained in Shanghai indicated guerilla activity throughout the territory in Japanese possession, involving over 700,000 armed partisans, including remnants of the regular Chinese armies, irregular bands, and the Eighth Route Army. The exact strength of that army, subject to varying estimates, was believed to be around 100,000 men.

But in spite of overwhelming numbers and the success of their harassing tactics, the Chinese had not succeeded in breaking the Japanese hold on North China. Out-numbered seven to one, the Nipponese still controlled the railways and strategic cities. The guerillas lacked the heavy arms necessary to inflict a decisive defeat upon the invaders, who were always able to retake any lost positions. The Communists, however, do not pretend that their tactics will inflict severe defeats. The object of their guerilla warfare is to prolong the war until Japan is economically and spiritually exhausted, then to unite with the main armies in a gigantic counter-offensive. The plan envisages years of warfare if necessary.

CLASH OF THE IMPONDERABLES

William H. Chamberlin, veteran correspondent of the *Christian Science Monitor* and author of *Japan Over Asia*, estimates the two outstanding developments of the war to date to be Japan's continued military superiority and China's unexpected unity. The outcome, he believes, will hinge upon the ultimate victory of one over the other.

Viewed in this light, the war becomes a death struggle between China's new nationality and the power of the Japanese army, in which the most significant event of the first year and a half is the fall of Hankow.

Loss of the Wuhan cities and their strategic north-south communications now inaugurates a most critical phase of the war for Chiang Kai-shek. His lateral rail links severed, Chiang is cut off from the north, east, and south, and forced to draw supplies over a new and hastily constructed rail and highway system from Burma and French Indo-China. The task of keeping these routes in working order will be tremendous.

More vital than logistics, however, are the moral and political effects of the loss of Hankow. All the disintegrating influences that so long delayed unification are liable to reappear with communications broken between the Central Government and the rest of China. It is anybody's guess whether or not the United Front can survive geographic dismemberment long enough to outlast the Japanese war machine. But the danger was fully appreciated by the Chinese leaders, who early planned political action to preserve the union should Hankow fall.

The chief factor favoring continued life of China's unity is the deep hatred for the invader held by the Chinese people. Bombing and burning, far from shattering morale, has only stiffened the will to fight. Hatred, fanned by expert propaganda, may prove stronger than sectional differences.

The Japanese undeniably hold the military whip hand. Better trained and equipped Japanese forces have carried out a series of uninterrupted advances in the face of overwhelming numbers and stubborn courage. Japanese staff work has proven superior to handicaps of weather and terrain from Peiping to the Yangtze Valley. Guerilla resistance has been effective, but it has not been decisive in itself, nor can it be.

China is paying for two generations of military and industrial unpreparedness. Her armies, fighting practically barchanded against modern machines, have given a world-thrilling exhibition of raw courage, but they still lack equipment, training, and leadership. The Chinese military establishment has improved since the outbreak of hostilities, but it is still unable to defeat the Japanese in the field.

Economically, China appears capable of a protracted war. Loss of her seacoast industrial and financial centers did not paralyze China's low-g geared economic system, for China is fundamentally an agricultural country, her commerce supplemented by small-scale factories. Chiang Kai-shek is reputed to hold huge silver reserves into which he has barely dipped. China's credit is not only excellent but has been improved by recent League of Nations action, and her currency has remained remarkably firm. If the back-door supply routes prove adequate to his war needs, Chiang has few economic or financial worries.

The Japanese economic picture, on the other hand, is far from bright. In spite of industrial progress, Japan is not geared for a long, major war. She lacks raw materials for

her industries, materials which must be imported and paid for in cash, since foreign credit is extremely tight. To meet the cost of war, Japan is straining every sinew to increase export trade at the expense of domestic markets, for only in exports can she realize the needed funds.

Far Eastern correspondents have reported that despite governmental promises that the act would not be invoked in the present conflict, virtually every provision of the Mobilization Act of last spring is now in effect. They report that labor has been mobilized, industry and professions conscripted, wages regulated, and a long list of commodities removed from home markets because the raw materials were needed for exports. In spite of feverish effort, Japan's foreign trade has fallen alarmingly.

Dwindling supplies and increased taxes have sent prices skyrocketing while wages, by government decree, remain almost stationary. The Japanese people, never enthusiastic for the China adventure, are feeling the pinch more and more. Hallett Abend of the *New York Times*, on a recent visit to Japan, was struck by increasing evidences of national poverty.

Higher taxes and geared-up industry have, it seems failed to keep pace with the cost of a war that is draining Japan at the rate of five million dollars a day. The nation has delved deep into its gold reserves, never great at best, to maintain its precarious credit abroad. In the last year more than half of Japan's gold has been exported, over four hundred thousand dollars have been shipped to the United States alone. But in spite of the bleak financial outlook, there is no immediate sign of collapse. Japan will undoubtedly be able to continue the war for some time to come.

Japan's economic weakness is the Achilles' heel of her army. If the nation should go bankrupt behind it, the army would be stranded in China and eventually destroyed by a war of attrition. That possibility is the hope of China, upon which the Chinese are basing their plans for protracted guerilla warfare. Japan cannot stop fighting until the last vestige of resistance has been stamped out.

Since the war began, the Japanese High Command has committed four strategic blunders. The first mistake was to underestimate Chinese resistance. In the hope of a quick and spectacular victory, the army attempted an invasion of China with inadequate forces and failed. Before this error could be corrected, China had acquired her second wind and the confidence to fight back, forcing Japan into a prolonged and expensive campaign. The

longer the war continues, the more serious becomes that initial miscalculation.

The second mistake was the destruction of the Shanghai industrial group. The Shanghai bankers and manufacturers were a major bulwark of the Central Government, an influential circle with much to gain by peace and much to lose by war. The razing of Shanghai's industrial district ruined this powerful faction and drove it into the ranks of the irreconcilables, leaving no reputable party in China able or willing to deal with the Japanese except by war.

Japan lost the war, in the opinion of many diplomatic experts, when she failed to dictate a peace after Nanking—a third error. Chinese morale was at its lowest ebb, the best Chinese army lay shattered before Shanghai, and the old Chinese spirit of defeatism was gaining ground. Had the Japanese displayed moderation, the conquest of North China might have been achieved then. Instead, the victorious army presented such a humiliating set of terms that Chiang Kai-shek, so it said, didn't even bother to read them. China had nothing left to do but fight. She regained her morale, stiffened resistance with a rebuilt army, and drew Japan ever deeper into her vast interior.

The penetration of China's interior was the inevitable aftermath of the failure of Japan's peace proposals, and the fourth and final error. As long as the armies of Chiang Kai-shek showed fight, the Japanese armies had to follow, even though the trail led deeper and deeper into a hostile and forbidding country where the people and terrain alike were strong against them.

Japanese communications are long and thin. In the face of a more powerful foe, this weakness would be fatal. Every mile Japan moves into China increases the frailty of her supply lines. Sooner or later they may stretch too thin and snap. When they do, China will strike. There is one historical example upon which every Chinese leader is extremely well informed. This is the Moscow Campaign of 1812.

The struggle, therefore, narrows down to a war of attrition between Japan's economic system and China's fledgling national spirit. If the Japanese people crack first, the destruction of their military power and empire is inevitable. Disintegration of China's unified front following the fall of Hankow will make Japan the ruler of Asia. The question is not which is the stronger, but which will be the first to break.



SOLDIERS OF THE ORIENT



A former Peking University student, now a guerilla, grins as he displays a captured Japanese rifle and bayonet. The overcoat is also loot of war.

A captured Japanese machine gun helps to equip Chinese soldiers in Central Hopei Province.





This modern Son of the Dragon belongs to the well-equipped regular troops of Generalissimo Chiang Kai-shek.



Japanese found the going tough through the Yangtze flood waters. Here infantrymen plow through mud and water near Matang in an assault upon the boom which held back naval vessels.

Retreating troops blew up bridges across the Yellow River. Here we see a temporary bridge, with the bridge destroyed by the Chinese in the background.



Red Chinese guerillas give the clenched fist salute over a piece of field artillery captured from the Japanese.

These are Mohammedan troops first organized by the Japanese to fight the Reds. Now they are a trusted element of the Red army of Hopei Province.



A Japanese outpost looks across the Yellow River in the Shansi district.



The storming of Kaiseng. Japanese troops scale the walls under Chinese fire.

General Lu Cheng-Tsao, a Red army chief in Northern China, has a 15-year-old aide, known as the "Little Devil."





Crack Chinese troops storming through Taierchwang to drive the invader from the south Shantung city. This was the first major defeat suffered by a modern Japanese army.



Chinese infantry struggling across the silted Yellow River.

Bagging the Hedgehopper

By
CAPTAIN JOSEPH I. GREENE
INFANTRY



Can we shoot them down or can't we? If 1,000 bullets per second will do it, we can. But if we insist that Ethiopia, Spain, and China have marked the acme of infantry antiaircraft tactics, we had better be changing our doctrine, and changing it fast.

It is time we decided, one way or the other, whether the fire power of infantry is deadly enough to bring down hedge-hopping planes, or whether it is little more than shooting at swooping eagles with an air rifle. Ten years ago, we thought we knew. After long study and test at Benning, the conclusion was reached that infantry could, with its own weapons, shoot low-flying airplanes down from the skies. Further test and development brought forth ways to train infantry in antiaircraft fire. And these, in turn, came out in regulations and field manuals. A tactical textbook also appeared,¹ which told what we could expect from enemy planes attacking with bombs, bullets, and gas, and what to do about it.

The result of all this has been a universal antiaircraft awareness among infantry regiments of all components. On every maneuver, when the enemy's planes come roaring over in simulated attack, the infantry lets them have it right back again. Rifles, autorifles, machine guns, and even pistols, in every unit within sight of the tree-scraping planes, swing up to let fly at them. Every man with his finger on a trigger takes a hurried aim well in front of the winged attackers, with a hastily estimated lead. And if it were real war, the infantry would, at such moments, be filling the skies with thousands of bullets.

¹*Infantry Antiaircraft Defense*, Special Test No. 267, Army Extension Courses, used also at The Infantry School.

This is what our infantry does now. This is what it is trained to do to the point where its reaction to sound or sight of hedge-hopping planes is automatic. But is this what our infantry would do—or could do—in war itself? Is this what the infantry of present wars is doing? Are we, in other words, training our troops for effective reply to the vicious, thundering air attack? Or are we, as that acute and thorough critic of modern warfare, Major Thomas R. Phillips, Coast Artillery Corps, suggests,² "placing undue faith in the results of peacetime firing" at targets towed by lumbering planes at "ideal altitudes"?

Major Phillips is far from being alone in his opinion. There is, indeed, no side of modern warfare on which there is a greater diversity of thought, or on which argument can get more heated. For that reason, if for no other, it is time for a reexamination of antiaircraft tactics.

In this article, however, it is intended to keep argument at the minimum and to fill most of the space with fact. These facts, the writer believes, will show that the infantry antiaircraft tactics now taught are in the main correct. Infantry should by all means let fly at attacking enemy planes with every weapon it has, short of hand grenades and trench mortars. And it shouldn't stop thinking about possible ways to use those.

That is what the main conclusion will be—because the facts support that conclusion. But first it should be made perfectly clear, right here at the beginning, that there is no intention whatever, in this article, of defending antiquated methods of troop movement. Reactionary doctrine

²"Air Power and Troop Movement," *The Infantry Journal*, May-June, 1938.

The air attack will shatter on the firepower of the foot soldier

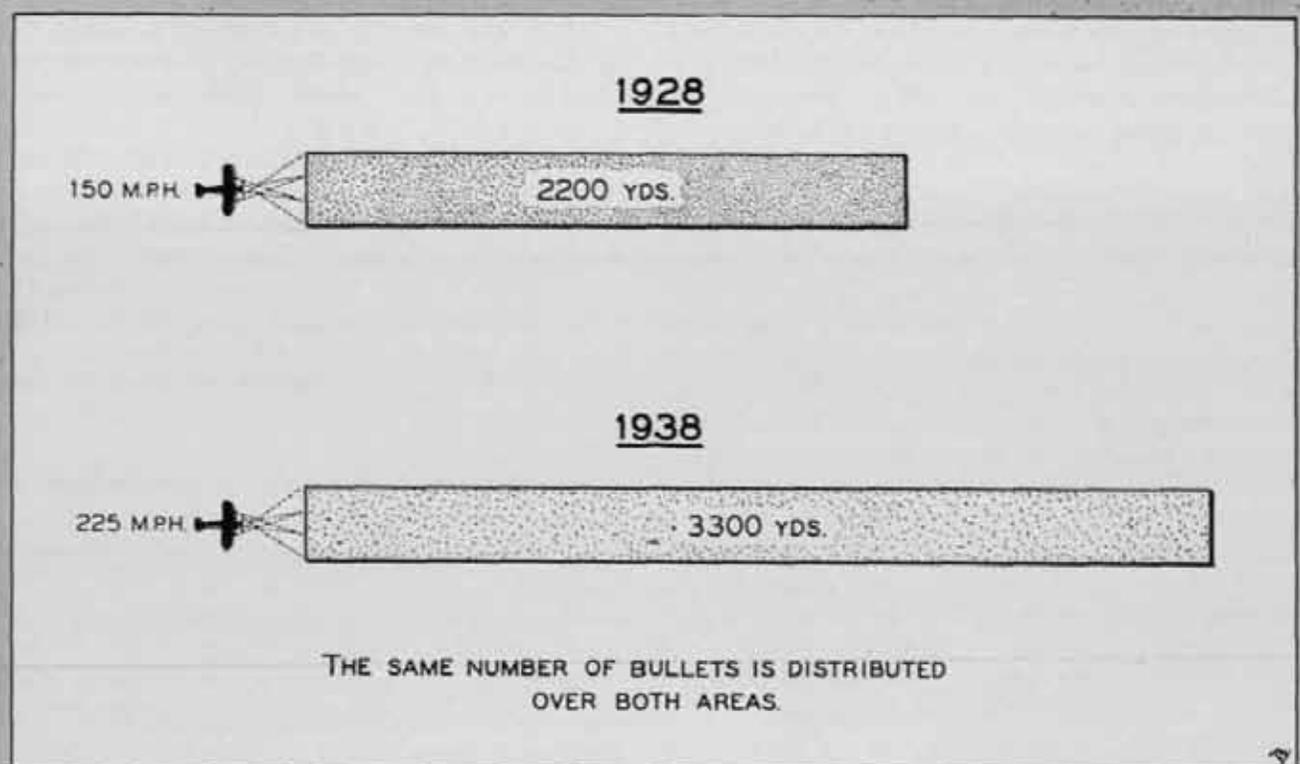


Figure 1. Machine-gun fire of attack planes is $\frac{1}{3}$ less intense than it was 10 years ago.

has grasped at active antiaircraft measures by infantry as a justification of ponderous movements of troops in the olden manner. If infantry can protect itself adequately from the air, so runs this thought of vintage 1903, it does not need to hasten toward battle in trucks; it does not need, when it must march afoot, to advance semi-deployed well into the fields and woods to the sides of the road, thus making itself a target thin and poor for the air attack, and at the same time retaining its tremendous and effective volume of antiaircraft fire. No! Since it can take care of the air attack, infantry must stay on the roads at two and a half miles an hour, no less—but also, no more! It must stay on the roads, deploying only a scant distance into the ditches and onto the shoulders when the air attack swoops down. And there, in a space too narrow for free firing and too crowded for reasonable safety from bomb fragments, it must do its stuff. It must stick on the roads, blasting at the air targets while receiving the full force of the air attack in a formation far too compact. Infantry must do it the hard way in order to preserve the scale of time and space that has been the standard since Hannibal hiked through Spain and Gaul.

There will be no defense of this attitude of mind in the paragraphs that follow. There will be no defense, either of interminable troop movements made over many hours in broad daylight. It will be assumed, instead, that infantry will use all modern means of movement, but will sometimes find no other way to get there, except in columns and on roads. For example, what if a brigade or two must pass by day through a defile where hostile bombs have temporarily blocked the road to passage by trucks?

As a matter of fact, if we examine closely The Infantry School text on antiaircraft defense, we will find it plainly stated that there must be no massed formations of infantry march. "For it is indeed true," this book says, "that the commander who exposes troops or vehicles in close-order formations to air attacks can expect the same results he could expect from the observed ground fire of artillery or machine guns." Thus, "... dispersion (in march formations) should be the maximum consistent with the accomplishment of the ground mission."

But the march formations which this text describes do not come up to these sound general principles. They are not based on modern war but on that of three decades ago.

In this same Infantry School text, and in articles which appeared in *The Infantry Journal* in 1928, and in others published since that time in *The Infantry School Mailing List*, the reasons why the fire of infantry should be effective against airplanes close to the ground have been thoroughly analyzed. But in ten years there have been improvements in attack aviation. And there have been wars. Isn't it possible, then, that the scales have tipped—that advantage has risen from the ground into the air?

For one thing, how much more deadly today is the vicious spray of bullets from the machine guns of attacking planes? Can infantry still take it? Or has it been doubled, or trebled to a point where no life can stay alive in its path?

Remarkably, what was written of the limitations of the fire of attack planes a decade ago is still sound. And more remarkably, that fire is considerably less intense now than it was then. For in 1928 the finest attack planes flew 150 miles an hour and carried four forward guns firing at a rate

of 1,100 to 1,200 rounds per minute. Today, these planes still carry four guns to fire forward and the cyclic rate is about the same. But today's planes attack at some 225 miles an hour, instead of 150. And this means that the bullets are spread over much more ground during each second of fire. (Figure 1). Where, at 150 miles an hour, a half minute's fire covered 2,200 yards, now, the same fire—the same number of bullets—kicks up the dust down a strip 3,300 yards in length. Thus the machine-gun fire of today's planes is one-third less than ten years ago.

It is also true that the far greater speed of today makes errors of aim all the greater, and makes it all the harder to follow a line of attack with accuracy. This affects not only the machine-gun fire that attack aviation uses to cover its attack, but also the dropping of fragmentation bombs. Planes fly so fast, nowadays, that their pilots simply cannot deliver accurately on ground troops the intense power of their attack. Accuracy, of course, is not so important in dropping bombs. These deadly eggs, particularly the parachute bombs, are dropped by dozens, and on open ground, spread their thousand fragments or more over a wide area. But ground is seldom without its irregularities, and the same humps and hollows that saved men from many a shell in France will go far to reduce the casualties from airplane bombs. And besides, they have to be dropped somewhere near the target to do their business. At 225 miles an hour a lot of them will go wide.

And now suppose we look at matters from the ground for a while instead of from the air. What new developments are there in the antiaircraft defense?

In the article quoted earlier, Major Philips makes an interesting statement about the effect of Ethiopian fire on Italian airplanes: ". . . 259 were hit by fire from the ground *but only 8 were brought down.*" It is the author himself who stresses his point—a ratio of roughly 32 to 1—by italics. This seems a strong indication of the futility of ground-troop antiaircraft fire. But there is more than one way of looking at this statement, and it deserves a full examination. First let us note that the total rounds fired, and planes fired at, are needed for any extensive analysis.

Since there are few accurate Ethiopian records, the first of these items is not available. As to the second, we do know that at the battle of Lake Ascagni, 17 of the 60 Italian planes used (or 1 in 4) were hit by fire from the ground.³ This figure is doubtless not accurate for the whole war but it gives an indication. We will not be so very far wrong if we combine these figures with the others. Thus, 1 plane in 4 hit, and 1 in 32 of those hit brought down, gives 1 brought down in 128 fired at.

But there are other things to consider. First, what was the state of antiaircraft training among the Ethiopian infantry? Probably low, very low. We can assume that many Ethiopian bands had never heard of it as such. Some soldiers may have had experience at shooting moving game, but not many; for the African native seldom

shoots at moving game when he can kill it standing still.

Again, what were the prevailing orders among Ethiopian troops about firing at planes? Were there standing orders to fire at planes whenever they attacked? Or was the fire spasmodic, a few shots here and there, like the Chinese fire at airplanes bombing Shanghai in 1932? Or was it a fire of desperation, as among the retreating Turks after Allenby's Megiddo in 1917?⁴ Though we must hazard a guess here, it seems probable that "spasmodic" is fairly close. It is unlikely that semi-civilized troops, untrained in antiaircraft firing, would normally bang away wholesale. Yet there must have been a fair amount of firing, since before the war was over, Italian planes were ordered to stay above a certain height (some hundreds of meters) while doing their bombing. Even a 128 to 1 shot is not so good if you risk it many times.

There are two more questions we can ask and not attempt to answer, leaving them simply as suggestions. What was the usual condition of Ethiopian arms as to accuracy and functioning? And was there always plenty of ammunition for firing at planes?

The main point here, of course, is this: A modern army, trained and equipped for intensive firing at low-flying attack planes, would have sent many, many times as much lead toward its enemies of the air as the troops of Haile Selassie did. But so far, in the wars of this world, maximum antiaircraft fire has never had a trial.

At this point suppose we see what quantity of infantry antiaircraft fire is reasonably possible. In doing this, let us use what is commonly considered the worst situation in which planes hurtling to the attack can find troops on the ground. Let us take a defile crowded with troops.⁵

Let us take this worst case and examine it from the ground up. In the tight squeeze of a jammed defile is there a chance for infantry? Let us see what could be done if we made the most of infantry's furious fire power.

In Figure 2 we have a defile, a deep one, with a road winding along its bottom and steep hills rising on both sides from the road. Troops caught in this trap by attack planes can only spread out over the width of the right of way. The hills, though not like cliffs, are too steep for rapid climbing. The defile in the figure is two miles long.

Let us move a sizeable body of troops through this defile—a division. Let us assume, at first, that there are no Coast Artillery antiaircraft units available, and that the division must use its own antiaircraft fire power. What, in that case, shall we use for infantry defense?

Let's make it strong; let's try one infantry brigade, less the howitzer and service companies of both regiments. Since the M-1 rifle is now well on the way, let us assume that the rifle units are equipped with this modern arm.

To protect the defile we use this antiaircraft detachment

³We should not forget that great as the Turkish panic and the slaughter of the British air attack were, enough Turks turned and fired to bring down three planes.

⁴At such points dispersion to minimize the effect of the (air) attack is difficult and the greatest delay and destruction can be obtained." *The Tactical Employment of Antiaircraft Artillery in the Independent Division and Corps.* C&GSS, 1937.

⁵"What Can We Expect of a Modern Antiaircraft Defense?" by Commandant Courbis. *La Revue Militaire Générale*, August, 1937, quoting *La Revue de l'Armée de l'Air*, June, 1936.

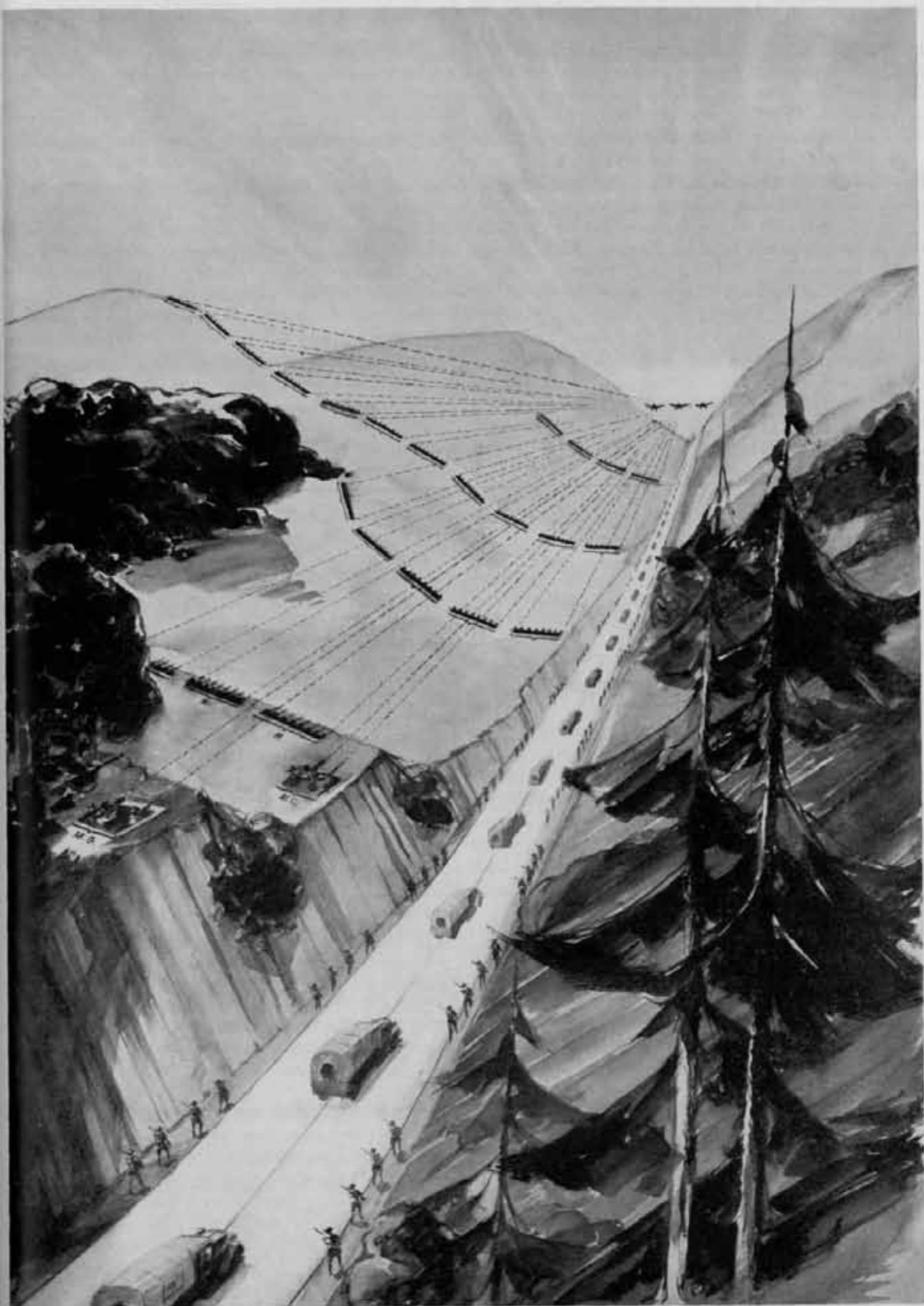


Figure 2

along its full length. Machine gunners, automatic riflemen, and riflemen stud the steep slopes of one side.⁶ They take all positions that offer a sweep of the narrow valley, up and down. They clear away the brush and lop off the limbs of trees to improve fields of fire. *And they dig in.*

Then, the rest of the division enters the defile, an infantry regiment leading, and soon the full two miles of winding valley road is full of marching troops. They are in single file on both sides of the road and their organic transport is on the road between. They are in the antiaircraft formation taught at The Infantry School.

Let this be the ground situation when the low attack strikes from the air. Coming from a flank, and banking swiftly, the hostile planes roar three abreast into and down the defile, machine guns wide open and tearing at the sides and floor of the valley ahead, and streams of bombs parachuting deliberate death into the valley behind. Other planes follow these as second and third waves of the air assault. But first, what ground fire meets the leading wave as it hurtles its course along the defile?

It will be simpler to grasp this if we use a brief table. In the antiaircraft brigade itself which we have placed to cover the defile we have the following, assuming that all weapons pick up the fire for just five short seconds⁷ as the planes come into close range:

Units	Weapons	Total Number of Weapons	Rate of Fire of Weapon per Second	Total Fire in 5 Seconds
18 Rifle Cos.	cal. .30 M-1 rifle	3,418	1	17,090
	cal. .30 autorifles	324	1	1,620
	cal. .30 machine guns	72	9	3,240
6 MG Cos.	cal. .30 machine guns	72	9	3,240
Total rounds				25,190

In this table, the automatic rifles are assumed to fire one shot at a time. There have never been exhaustive tests of this weapon to determine its antiaircraft possibilities in full-automatic fire. There are reasons to believe, however, that it might be of much more antiaircraft value if it were thus fired. Nor have I included in the table the possible close-range pot shots of the 2,000 or more pistols in our antiaircraft brigade. Nor are caliber .50 machine-gun companies included. These would add 1,200 heavy rounds in five seconds if these units were not busy at antitank defense. Since a defile like the one we have assumed is poor ground for hostile tanks, antitank guns might well be available for antiaircraft use. This double use is generally frowned upon, however.

You can study these figures backwards and forwards, but they still indicate a tremendous volume of fire. And remember—the troops delivering this storm of bullets are well dug in and protected from their attackers.

If when the air attack hit, the defile were full of trains, or of troops comparatively low in antiaircraft fire power, the marching column could add only a fraction to the fire of the antiaircraft brigade. But if, as we are assuming, the defile road is full of infantry, these troops can deploy

narrowly on the road and its shoulders, and blast away at anything that comes over. They will be deep in the valley, though, and most of them may not be able to fire even for the brief space of five seconds. Some machine guns may not get into action at all, but riflemen and autoriflemen, swinging their weapons to their shoulders in short order, should get in about three fast shots apiece as the hostile planes speed by.⁸ This would add, assuming that the troops (less trains) of a regiment plus two battalions were within the defile at the moment of attack,⁹ roughly 7,500 rounds of caliber .30 fire to the 25,000 rounds of the antiaircraft detachment. Call the total 33,000.

Now we have the tremendous total of infantry antiaircraft fire power. But we must see how it is delivered before we have the full picture before us. We took the defile in our situation as being two miles long. It takes modern attack planes just 32 seconds to fly two miles.

In 32 seconds, then, the leading airplanes, in the attack as we have described it, would be met by 33,000 rounds of fire. It makes no difference whether those leading planes carry smoke to cover the planes that follow behind them, or mustard gas, or machine guns and parachute bombs—they get the same terrific blast of welcome in any case. They are on the receiving end of aimed ground fire at the rate of 1,000 rounds per second!

This is four times the fire that three planes themselves can deliver. They have 12 guns firing 20 rounds a second. Their fire, moreover, is area fire. They fly 110 yards per second at 225 miles per hour. Each second of their fire is spread over a length of 110 yards and a width of at least 50 or 60. This means that one bullet strikes in every 25 or 30 square yards. And as far as the antiaircraft brigade is concerned, it is well dug in, and it should receive few casualties from this comparatively thin sheaf of aerial fire—thin simply because it moves so fast over the ground.

But turning the picture around again, can we not get some idea of how the ground fire is dispersed as it funnels up toward the planes? There are 1,000 rounds per second, but even this tremendous blast could spread all over the skies. Does it have factors of dispersion, like the fire from the planes, which gravely reduce its potential effect?

We can only give a rough answer to this question, but one that indicates how concentrated this fire must be. Most of the rifle and autorifle fire directed at a plane should come within 10 or 15 yards of it, or hit it. Machine-gun fire may miss more widely. Suppose we take 20 yards as the radius within which most of the fire will go, as in Figure 3. Here, the area inside the broken line represents the dispersion area of all but a few wild shots. This area contains about 4,000 square yards. But the same three planes, viewed from the side would appear as in Figure 4. This area contains about 2,700 square yards. Thus 3,500 yards will give us a rough average for the area through which most of the ground fire will pass.

Now what does this mean in terms of the deadly busi-

⁶As a general thing, positions on two sides of a defile might receive each other's fire. The positions shown are diagrammatic.

⁷Tables of Organization, C&GSS, 1937.

⁸Men can fire three hasty shots with the semiautomatic rifle, or the automatic rifle, in two seconds or a little over.

⁹Reference Data, C&GSS, 1937.

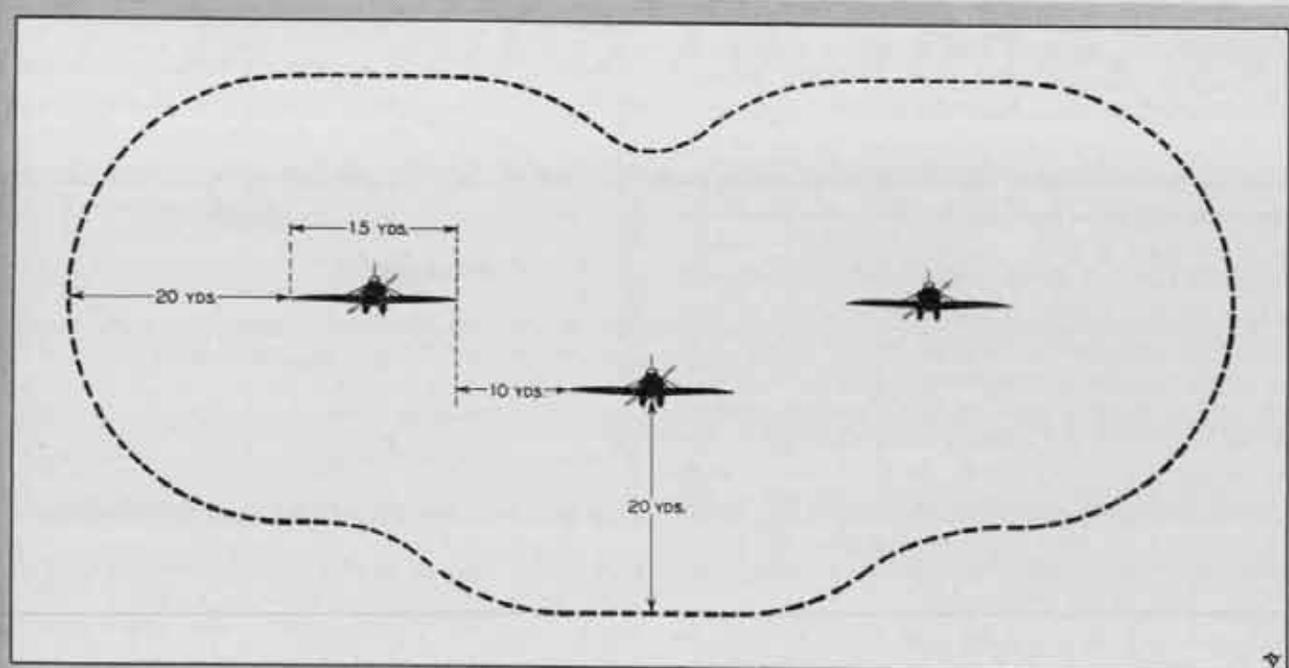


Figure 3. Where the Infantry fire goes. Head-on view.

ness of war to an enemy pilot heading his plane into the hail of infantry fire coming at him from the defile? It means exactly this: That if the ground fire is spread evenly over the areas shown in the figures, every single square yard of his plane exposed to fire will be struck by at least 9 bullets as he flies the length of the defile.¹⁰

One bullet for every square foot of plane exposed!

Naturally, the fire of the ground troops will not be spread evenly throughout the areas shown in Figures 3 and 4. If the ground troops are well-trained in antiaircraft firing, the fire will be much denser near and on the planes themselves than 20 yards out from them, and the percentage of hits will be correspondingly higher. The evenly distributed fire we have assumed works out to a little less than 1% of hits out of 33,000 rounds fired. This is a low estimate rather than a high one, of what we can actually expect in war. At towed-target firing, riflemen make 2% to 3% of hits on targets hardly one-fourth the size of an airplane. Before it was against regulations to conduct antiaircraft firing at targets towed but a few yards off the ground, 8% and 10% of hits were made upon these same small targets.¹¹ It would be surprising in war if riflemen, with even a small amount of antiaircraft training, do not average 2% hits out of the total rounds they fire. Machine gunners will not do as well as that because of the natural dispersion of antiaircraft machine-gun

fire and the greater difficulty of holding a firing machine gun aligned on a moving target. The French writer referred to in the footnote says that it takes 8 times as many machine-gun bullets as rifle bullets to gain one hit.

By now, it should be plain why the fire of ground troops in Ethiopia, in China, and in Spain, has not been highly effective. There hasn't been enough of it! Fill the air with bullets and no attack plane yet built can live through the fire. That's all it takes.

In the defile situation we have used as an example, the three leading planes of the hostile attack would be lucky to get any distance down the defile before receiving hits that would bring them to earth in a crash or a forced landing. As long as the planes could keep going, they would be capable of serious damage to the troops actually marching through the defile on the road beneath them. But the entrenched infantry antiaircraft brigade on the slope of the defile should get no more than light casualties from machine guns and bombs alike. We have already seen that the machine-gun fire from the air is not very dense because it moves so fast. The fragmentation bombs are bad for troops with little cover. But the entrenched troops of the antiaircraft brigade can duck when these bombs fall near. A parachute bomb doesn't hit for several seconds after the plane that drops it passes over. And by then, the plane will be fairly out of range, anyway. Remember, we have only figured on 5 seconds of fire for the antiaircraft troops. Some of them, in extra good positions, will be able to fire at the planes for 8 or 10 seconds as they approach and, provided no bombs fall close, for the same length of time after they pass by or over.

It follows that the antiaircraft brigade, which delivers four-fifths of the total antiaircraft fires we have estimated possible, can give the same hard dose to the second wave

¹⁰33,000 rounds
3,500 sq. yds. = 9 bullets per square yard.

¹¹Captain P. Gauvin, of the French Colonial Infantry, in *La Revue des Troupes Coloniales*, July, 1938, writes that French results on air targets towed low to the ground are: rifle, 33% machine gun, 18%. This fire was probably conducted against large types of towed targets roughly the size of an attack airplane fuselage. In early firings at The Infantry School on targets 3 by 15 feet towed directly toward the firers, as many as 40 hits were registered by three platoons with Springfield rifles.

of planes—and the third, and the fourth—and as many as come. As long as they try to come down the defile flying low, the concentrated antiaircraft fire of infantry will practically blast them from the air.

Thus the kind of a defile that might appear, at first thought, to be the deadliest sort of trap for marching infantry, turns out to be truly deadly for the air attack. Indeed, any manner of defile, properly protected by antiaircraft units is just such a trap, with possibly one exception—a long, narrow bridge. A bridge or causeway so long that its center part could not be well covered by fire from shore would take a lot of preparation to protect adequately. There are two ways it could be done. Sandbag redoubts could be built along the sides, or armored trucks or cars could be posted at short intervals along the bridge. Shore fire would give good protection for at least 300 or 400 yards out from the banks. But in general, a defile adequately covered by infantry fire is the worst hornet's nest low-flying aviation can conceivably fly into.

The same technique can be used where there is no defile. It could be used on a flat plain or desert. But in the usual case deployment over a considerable width, and movement across country in full readiness to open antiaircraft fire, should give protection enough on such terrain without a set intrenched defense.

The defile type of defense can be used to protect truck columns moving on open roads. It should not be hard to work out a system of leapfrogging by which half or a third of the infantry in a column could be protecting the movement of the rest at all times. The Infantry School text, referred to earlier, gives a method of using machine-gun units in this manner to cover marching foot troops. But it is doubtful whether the machine-gun units, by themselves, have enough fire power. There should be a sizeable fraction of the rifle troops used in the same way; for, after all, it is the rifle that furnishes the great bulk of the infantry antiaircraft fire power. Such movements, of course, would not be rapid, owing to the time it would take for antiaircraft troops to intrench.

The same need for augmentation by rifle units is true of the Coast Artillery machine-gun antiaircraft defense. The attachments now given to infantry divisions in problems at the Command and General Staff School are woefully inadequate. The Leavenworth antiaircraft text earlier quoted states plainly enough that "the limited amount of matériel available will usually force" Coast Artillery antiaircraft troops to establish only "a defense at the start and finish of the march, together with a defense at one or two points en route." This refers to the gun defense, as well as to the machine-gun defense against attack aviation. But surely the machine-gun defense can be greatly augmented at any time by using a regiment or two of infantry in addition.

In any case, the antiaircraft protection must be of the stoutest. The lesson of Guadalajara was not that daylight truck movements are next to impossible in the face of a strong attack threat from the air. The lesson was that

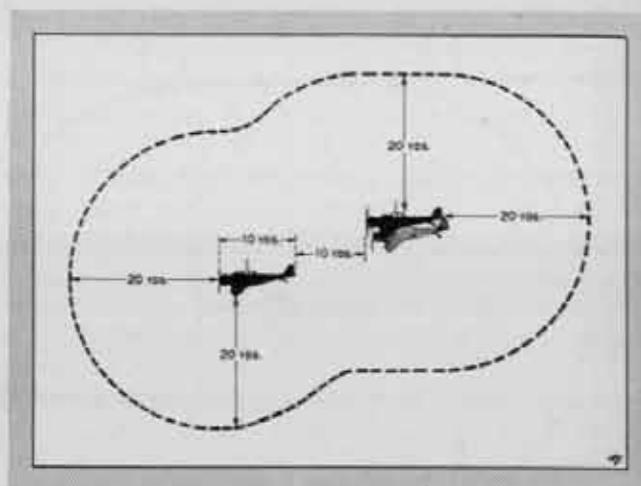


Figure 4. Where the Infantry fire goes. Side view.

unprotected movements of the kind smeared at Guadalajara are highly dangerous when the enemy is liable to smack down with his air attack. There will always be times when troops, whether they are in trucks or afoot, can only get forward at slow rates of movement—when the state of the routes will not permit the usual speeds of travel. It is then that intense infantry antiaircraft fire becomes vital.

The fire of infantry centered upon attacking planes is more than delicate engines and the pilots who direct their flight can conceivably stand. Neither man nor machine is protected by armor, for the weight of armor is out of the question in attack airplane designs. There is no argument as to the effect upon unarmored planes of rifle and machine-gun bullets, provided only that bullets are fired at them with sufficient density. Planes can take a lot of punishment, but not on their vital parts. The steel of cylinder walls is brittle and easily smashed, propellers can be thrown off balance and engines thus ruined by bullet holes through their blades. And there are many other vulnerable spots, including the pilot himself. It is only a matter of creating such a veritable blast of fire from the ground that a vulnerable point is certain to be hit. And infantry can do that very thing.

If we counter every low attack with the heaviest of fire, the enemy will not try such attacks for long. He will soon enough learn to stay above the fire of infantry. True, from a thousand yards or so he can still drop his bombs. But his machine-gun fire will be worthless and his small bombs will be dropped with even less accuracy than they are now. Much of the battle will be won when the hedgehoppers are driven toward the clouds.

Then why not give the powerful means actually in our hands a thorough trial—why not stick to our guns in every sense—before we begin to say it can't be done? We are in the antiaircraft habit of thought for sound reasons, not on faith alone. When it can be shown that a thousand bullets per second will not bring down attacking planes, only then will the sound reasons be gone—only then should infantry give mastery to the air.

Something To Shoot At

By MAJOR S. L. McCROSKEY, C.A.C.

Is it feasible to design an aerial antiaircraft target which will fly unmanned, on any desired course, under controls operated from the ground? Moreover, can such a target be landed at will without cracking it up nine times out of ten?

To one unfamiliar with the tremendous difficulties usually attending a development of such radical nature, the problem may not seem so difficult. We moderns have become so inured to inventions which will do the impossible, that we accept with little more than casual comment, a report that some one has just successfully completed a round trip to the moon. But to those who have struggled with the design and construction of even simple machines, the idea of an unmanned airplane, controlled from a remote station on the ground, brings visions of a maze of complicated mechanisms, delicate in adjustment, and of questionable dependence. There is no doubt that this conception of the problem is more nearly correct than that of the layman.

Yet, the old adage that necessity is the mother of invention, is still ninety-nine per cent correct. If there is a real need for a robot target there is no doubt that it can and will be produced.

The present standard sleeve tow target used by American antiaircraft artillery is a well-designed device. Within its limitations it has served its purpose very well up to the present. However, it has certain inherent defects which are most undesirable. Among these defects may be listed the following:

At the desired altitudes and ranges it is much more difficult to see than a real airplane.

When going away from the battery it cannot be fired at because of the danger to the towing plane.

Due to air resistance, it sets up a heavy drag, thereby making it impossible for the average towing plane to attain altitudes and speeds suitable for proper training of AA gunners.

Though the present sleeve targets are of advanced design it is doubtful that they would stand up under the terrific strain incident to towing them at air speeds much in excess of 150 miles per hour.

The requirements of safety for the towing plane limit the types of courses that may be fired.

Towing a sleeve target is a costly operation because a powerful and expensive airplane is required to be in operation for a long period. This is true both of preliminary training and in actual firing. Moreover, many hours of the pilot's time are devoted merely to flying back and forth across the field of fire waiting for surface boats to get out of the way or for clouds to clear. This time is always freely given in a fine spirit of coöperation, but it can-

not add much to a pilot's training and must certainly be a very tiresome job.

Last but not least, a sleeve target does not simulate the performance of a hostile airplane. This shortcoming alone is sufficient to justify an effort to find a better substitute.

Antiaircraft gunners must be trained against targets that are realistic. Obviously, training against targets which fly down the groove at air speeds of 100 miles per hour cannot develop the knowledge and skill necessary to cope with planes that will attack at speeds up to 300 miles per hour and will maneuver and approach from any direction.

What sort of a target will meet the requirements? Nothing short of a real airplane will satisfy, and obviously it must be operated by remote control. Is this development feasible?

The British say "Yes" and have actually done something along this line. As far back as 1935, articles appeared in both American and British newspapers and periodicals concerning the "Queen Bee," a radio controlled, pilotless airplane designed for target use. These target airplanes, manufactured by the deHavilland Company, are similar in appearance to the "Tiger Moth" light trainers used by the Royal Air Force. They differ in construction in that wood is substituted for metal in the "Queen Bee" wherever possible, in order to facilitate salvage when the craft is brought down in the water. The planes have two cockpits. The forward one can be fitted for control by a human pilot. Obviously this arrangement was for use during the development and test phases. The rear cockpit contains the robot control equipment. The planes are equipped with Gypsy-Major, 130 h. p., air-cooled engines, giving them a cruising speed of 90 to 100 miles per hour and a ceiling of about 10,000 feet. Top speeds are reported to be about 130 miles per hour. They are launched by catapult. One article reports an endurance flight of over three hours during which time controls were exercised from the bridge of H.M.S. *Neptune*. Controls operate to a distance of ten miles.

No details concerning the design of the radio control mechanisms are available. However, all reports indicate that the mechanisms operate quite satisfactorily.

That the British believe they are on the right track is evidenced by the fact that a considerable number of "Queen Bees" have been manufactured and put into service. Several of them have been shot down by His Majesty's expert antiaircraft gunners. In addition, more recent reports indicate the development of a successor to the "Queen Bee," known as the "Airspeed Queen Wasp."

This latest "Queen" is equipped with a 355 h.p. Armstrong Siddeley Cheetah IX motor. It is also built largely of wood and is much faster than the "Queen Bee." Its di-



The 1st Antiaircraft Division, British Army, prepares to launch a "Queen Bee." Note the catapult machinery and light construction of the plane.



The "Queen Bee" takes off without a pilot and under radio control.

mensions are: wing span, 31 feet; length, 26 feet; height, 8 feet 9 inches. The "Queen Wasp" can be equipped either with pontoons or landing wheels.

An examination of the capabilities of the "Queen Bee," discloses that these are somewhat less than are considered essential. Lack of speed is the principal deficiency. However, the "Queen Bee" was only the first step. The "Air-speed Queen Wasp" is doubtless much further advanced in design as well as in capabilities.

American development of a radio controlled target has lagged behind the British. But the problem is now receiving study. Even prior to the receipt of the first meager information concerning the "Queen Bee," the Chief of Coast Artillery was evincing much interest in the development of a better target for antiaircraft gunners. In line with this, about a year ago he requested the Chief of the Air Corps to investigate the possibilities of supplying a robot airplane target. The Chief of Air Corps concurred, and it is understood that the investigation is progressing satisfactorily.

Coincident with the inauguration of studies by the Chief of the Air Corps, the activities of the Reginald Denny Industries in the production of toy, powered airplanes were noted. The Reginald Denny Industries, a concern located in California, grew from a hobby of a motion picture star whose name the company bears.

For several years Mr. Denny and his associates have been building toy airplanes for commercial sale. These planes are powered with gasoline motors and are capable of rather astounding flights. The requirements for an anti-aircraft target became known to the Denny Industries and they proceeded to build a larger and more elaborate

toy and equip it with radio control. It is understood that several of these planes were built and tried out. Although the planes were smashed up, one after the other, each time important facts of value in building the next one were learned. The work has been so promising, that at the request of the Chief of Coast Artillery, the Chief of the Air Corps has initiated the purchase of three of these small planes for trial.

The general characteristics of the Denny targets are as follows:

Ceiling: 7,000-8,000 feet.

Maximum speed: 75 miles per hour (approximately).

Controls: Radio and automatic.

Wing span: 12 feet.

Length of fuselage: About 8 feet.

Parachute equipped, opening automatically to assist in landing without damage.

Fuel capacity: 30 minutes of flight.

Launching: Simple catapult.

It was hoped to have one of these devices ready for demonstration at the recent Fort Bragg exercises but unfortunately this could not be done.

These little targets do not have the characteristics required for antiaircraft gun training, but they represent a step in the right direction. They may fill the bill for machine-gun target use and also for the use of gun batteries. Many organizations, such as ROTC units, have scant opportunity to practice trackings because of lack of airplanes. If the Denny target will operate dependably, it may well meet the need in these cases.

In the meantime, studies looking toward the production of a target of greater capabilities continue. It is believed that the following characteristics represent about the maximum that should be initially attempted:

- a. General appearance: That of a small airplane with a wing span of from 20 to 30 feet.
- b. Means of propulsion: Gasoline motor.
- c. Speed at maximum altitude: 150 miles per hour.
- d. Service altitude: 10,000 feet.
- e. Duration of flight after reaching service altitudes: 1 to 2 hours.
- f. Visibility to 8,000 yards slant range. (Accomplished through the use of smoke candles or other suitable means).
- g. Flotation to permit recovery after alighting on water.
- h. Maximum practicable protection against damage by water to engine and radio.
- i. Control: Combined automatic and radio so designed that upon launching the target will climb in a spiral to the desired altitude, after which it will level off and fly on an approximately rectilinear course until diverted from that course by radio control. The radio control must be such as to permit directing the target on any selected course.
- j. Landing to be accomplished automatically or by radio control in such a manner that the target may be landed within an area one-half mile square; damage to the target due to landing to be nil or at least limited to that which can be repaired quickly and cheaply.
- k. Cost in quantities: Not over \$1,500 per target.

While some of the above characteristics appear difficult to meet, none of them are insurmountable. In the light of British progress it seems not unreasonable to suppose that

the required characteristics can be met and even surpassed.

It is granted that, until remote control is far more dependable, it will be unwise to use a robot target near thickly settled communities, for it might get out of control and land in someone's front yard. Moreover, the full training potentialities of robot targets will not be realized unless the firing battery is so sited that it can fire at a target approaching from any direction. This means that the firing must be done in some large unsettled area which can be closed to public activity as a matter of safety.

So far this discussion has been based primarily on the need of a better target for the antiaircraft artillery. But if a robot target is produced, it should have important application in the training of other arms as well. Air Corps pilots must be trained to attack other planes in the air; infantry, field artillery, and cavalry must protect themselves against low flying attack planes. The robot target will meet training requirements of these arms admirably. It is certainly an improvement on a towed sleeve target or hydrogen filled balloon.

The question at once arises: can we afford to shoot at such expensive machines? If we do shoot at them, we will certainly bring some of them down; otherwise we had better close station and go on home. However, if a robot target can be supplied at a cost of roughly \$1,500 and if it will last for, say, 30 to 50 hours, there will be little if any increase in costs over the present sleeve target.

Should gunners become so expert that target expense will be increased too greatly we can pull our punches by suspending fire when correct adjustment is indicated. Also our punches may not be so potent if we toughen the problems a bit. We can keep the target out of the groove and have it maneuver under simulated service conditions. Even if we knock down several targets, many target parts can be salvaged for use again. Moreover, the end to be gained justifies the cost, even though it be high.

The American taxpayer is spending enormous sums of money for adequate antiaircraft equipment. He expects the Army to know how to use this equipment effectively when the need arises. Real training against real targets is the only way to assure such results.



The detail at the control-panel directs the "Queen Bee" in flight.

A bit! A salvage crew from HMS Newcastle recovers a "Queen Bee" shot down by AA gunners. The practise was witnessed by King George VI.



A Plotting Board for AA Target Practice Analysis

By Staff Sergeant Herbert W. Conklin, Coast Artillery Corps

In the analysis of an antiaircraft target practice it is necessary to determine the speed of the target. The only method that can determine this speed accurately is a plot of the horizontal projection of the course. Since this plot has to be made, and is made from the data furnished by the camera stations accurately located at the ends of a surveyed baseline, there is no reason why the horizontal ranges from the base end stations should not be read directly from this plot.

Most antiaircraft record sections have improvised boards upon which to do this plotting, but in many cases such boards have been locally and crudely made, and have been constructed so as to be of use for one particular baseline only. A universal board is needed to take the place of the many boards now in use. The records section of the Headquarters Battery, 2d C.A. has had to take records for the firings of its own regiment, the firings of the Coast Artillery School and the Coast Artillery Board. All of these organizations have their own baseline set-ups, all different, so that the records section has been compelled to construct and have on hand as many as six different plotting boards to take care of the many baselines in use.

To overcome the difficulty of using several boards, and to provide one universal plotting board suitable for a baseline of any length and azimuth applicable to antiaircraft firings was the object of the design of the board described herein.

In addition to the horizontal plot, this board, by the addition of a grid chart will also serve as a slant range board, solving the elements of the right triangle in the vertical plane, *i.e.*, slant ranges and altitudes.

DESCRIPTION OF THE BOARD

A piece of linen-backed drawing paper was stretched and shrunk upon a drafting board 36 inches by 48 inches so as to cover the entire board. Approximately five inches

from and parallel to the lower edge of the board a black line was drawn across the full length of the board. This represents the baseline on the horizontal plot, and the ground line on the vertical plot.

With the origin on this line and five inches from the right end of the board a grid chart was constructed at a scale of 1 inch equals 200 yards. Even 100-yard lines were drawn in black; intermediate lines (0.10 inch apart of 20 yards) were drawn in red. Vertical lines represent horizontal ranges, and horizontal lines represent altitudes. This chart is not used when plotting in the horizontal plane, but is very useful when plotting in the vertical plane. Its use will be described later. A quadrant with 20 inch radius was also drawn on the chart with the origin as a center, and graduated every 5 mils. The chart was protected against wear by the application of five coats of clear duco.

Two plotting arm and azimuth circle assemblies were mounted on a bar in such a manner as to permit of their being moved along the bar to any desired position and clamped into place. The bar, known as the baseline bar, was then securely fastened to the board in such a manner that the centers of the azimuth circles and the zeros of the plotting arms were accurately over the baseline. The plotting arms may be clamped to the azimuth circles and move with them or may be loosened and the azimuth circle rotated independently. This permits the setting of any desired azimuth. The azimuth circles were made of 1/16 inch brass 7 1/2 inches in diameter and graduated every 50 mils. A vernier permits the setting of these circles to 5 mils. See Fig. 1.

OPERATING THE BOARD

Orientation. Loosen the clamping nuts on the RIGHT azimuth circle assembly, and move the whole assembly

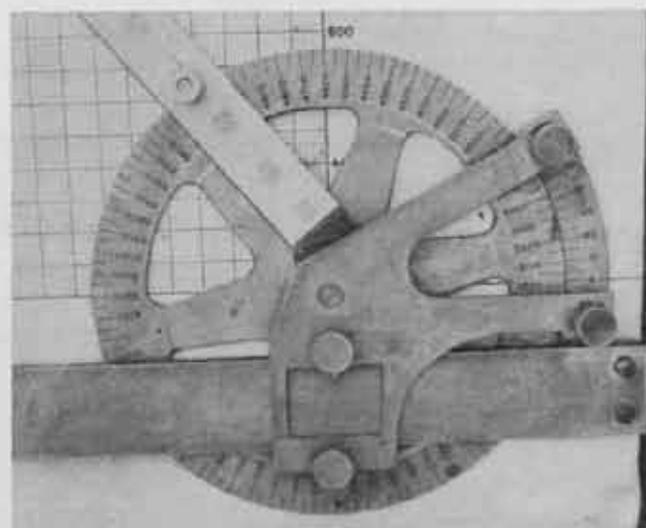


Fig. 1

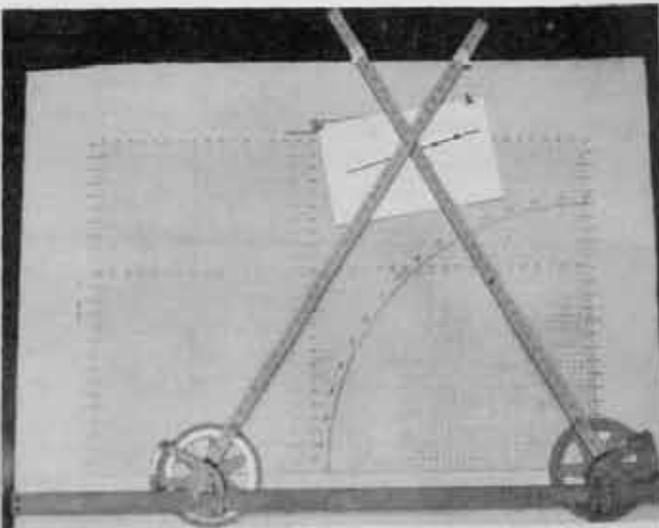


Fig. 2

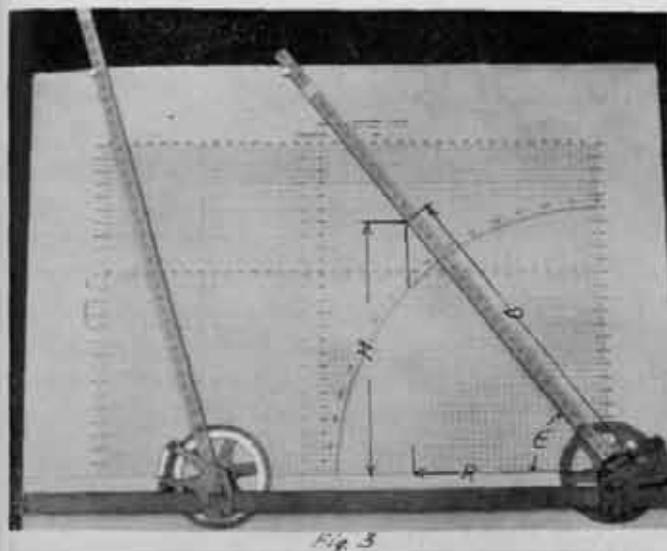


Fig. 3

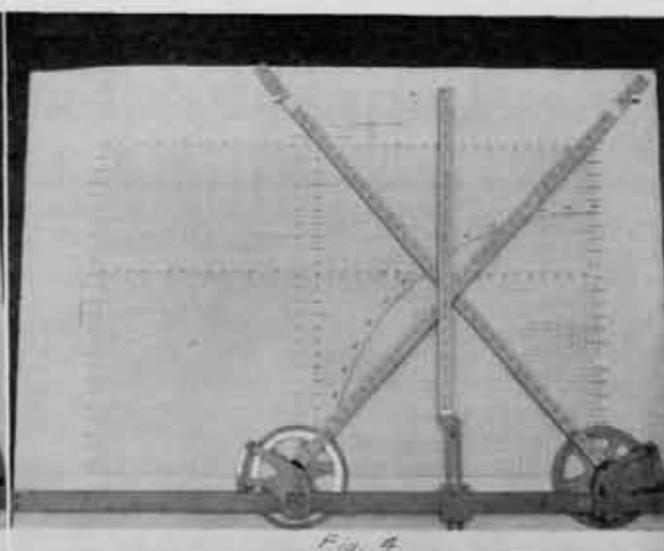


Fig. 4

until it is directly over the origin of the grid chart. This is not absolutely necessary, but will avoid the necessity of resetting the assembly when plotting in the vertical plane. Loosen the vernier clamping nuts, bring the zero of the vernier in coincidence with the baseline and clamp fast. Loosen the azimuth clamping nut that holds the plotting arm to the azimuth circle. Lay the fiducial edge of the RIGHT plotting arm accurately over the center of the LEFT azimuth circle assembly. Holding the arm in this position rotate the RIGHT azimuth circle until the RIGHT-LEFT azimuth of the baseline is set. Clamp the azimuth circle fast to the plotting arm. This arm is now oriented. Lay the fiducial edge of the LEFT plotting arm accurately over the center of the RIGHT azimuth circle assembly, loosen the clamping nuts that hold the LEFT assembly and move the whole assembly along the bar until the range of the baseline is read from the arm. The plotting arms are graduated to the same scale as the grid chart, i.e. 1 inch equals 200 yards. Having set the LEFT assembly at the correct distance, clamp in place, set the vernier accurately over the baseline, set the LEFT-RIGHT azimuth on the azimuth circle and the board is oriented, and ready for plotting.

Making the horizontal plot. From the projection of the film the data relative to the target position is entered on form AA-18 as follows:

Azimuth and Angular Height from 01
Azimuth and Angular Height from 02

Of these data, the azimuths of the target from the base end stations are all that are needed to make the horizontal plot. By setting these azimuths on the azimuth circles, the plotting arms will cross and determine a point on the course of the target in the horizontal plane. A piece of onionskin secured to the board by means of scotch tape is used to record the course of the target. The ranges to the various points along the course from the base end stations are read and recorded. By scaling the distance from the first to the last plotted point and dividing by the

elapsed time of the course, the ground speed of the target is determined. See Fig. 2.

Making the vertical plot. From form AA-18 we obtain the angular height (E) of the target at the various points along the course. From the horizontal plot we have obtained the horizontal ranges (R) to the same points. We now proceed to the grid chart and the right plotting arm to determine the altitudes (H) and the slant ranges (D). Set the plotting arm at the angular height (E) using the large quadrant. Where the fiducial edge of the plotting arm intersects the horizontal range line on the chart, read the slant range (D) to the target from the scale on the plotting arm, and read the altitude (H) of the target from the chart. See Fig. 3.

This board was given a very thorough test during the firing phase of the Fort Bragg exercises and proved to be both accurate and rapid. During these exercises five separate baselines were used, all different both in range and azimuth, and the change from one baseline to another was accomplished in a minimum of time and without loss of accuracy in orientation or data obtained.

In plotting machine gun courses the same procedure holds except that it is advisable to increase the scale of the board to 1 inch equals 100 yards. This is accomplished on this board by numbering the chart and scales on the plotting arms in red to this scale. The 01 target position detail have a great deal of difficulty in tracking a target when the section is located near the battery. For this reason it is often desirable to move the 01 station back and away from the guns. This requires a target relocation when plotting the course. On this board this is accomplished by the use of a gun arm platen and an additional plotting arm. See Fig. 4.

Antiaircraft artillery, because of its mobility, will seldom encounter the same conditions as found in seacoast artillery. While it is recognized that the use of cameras and accurately surveyed baselines is purely a peacetime set up for training purposes, if we are to get the most out of firing AA guns, analysis should be based on accurate plots.

The United States Coast Artillery Association



The purpose of the Association shall be to promote the efficiency of the Coast Artillery Corps by maintaining its standards and traditions, by disseminating professional knowledge, by inspiring greater effort towards the improvement of matériel and methods of training, and by fostering mutual understanding, respect and cooperation among all arms, branches and components of the Regular Army, National Guard, Organized Reserves, and Reserve Officers' Training Corps.

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The Coast Artillery Journal

MAJOR AARON BRADSHAW, JR., Editor

The JOURNAL prints articles on subjects of professional and general interest to officers of all the components of the Coast Artillery Corps in order to stimulate thought and provoke discussion. However, opinions expressed and conclusions drawn in articles are in no sense official. They do not reflect the opinions or conclusions of the Chief of Coast Artillery or any other official or branch of the War Department.

The JOURNAL does not carry paid advertising. The JOURNAL pays for original articles upon publication. Manuscripts should be addressed to the Editor. The JOURNAL is not responsible for manuscripts unaccompanied by return postage.

News and Comment

The Individual Trophy

Nine hard-working committees have completed their computations and the JOURNAL is now able to announce the winners of sabers in the Coast Artillery Association Individual Trophy award. The sabers go to officers of the grade of captain or lieutenant who have done most to promote the training (active and inactive) and esprit of the nine regiments that made the highest percentage in the individual competition.

It will be recalled that the individual trophy heretofore was won by the officer accumulating the largest number of credit hours in the nine corps areas as a whole. This year, however, no high man for the Coast Artillery Corps at large was selected. The awards were made to one winning officer in each of the nine corps areas.

Here is a brief résumé of the plan by which the winners were determined:

INDIVIDUAL TROPHIES

An officer's saber will be presented each year to a Regular Army or Reserve regiment in each corps area, under the following conditions:

a. The regiment's average Coast Artillery Reserve officer strength on the last day of December and June must be 30 or above.

b. The number of Coast Artillery Reserve officers in the regiment who have earned 25 hours or more of credit while members of the regiment as evidenced by completed subcourse certificates or satisfactorily completed command and general staff lessons between July 1st and June 30th, will be divided by the regimental strength as determined in paragraph a above and the result expressed as a percentage.

c. The regiment with the highest percentage will receive the saber.

d. The saber will be awarded to the Coast Artillery Reserve officer of the regiment in the grade of 2d lieutenant, 1st lieutenant, or captain who has done most to promote the active duty and inactive duty training and the esprit of the regiment, during the year.

e. The officer will be selected by a committee composed of the field officers and the Unit Instructor of the regiment.

The winning regiment in each corps area and the officer selected by the committee of field officers and the unit instructor are:

FIRST CORPS AREA

606th C.A. (TD) 2d Lt. John N. Tulley, Boston, Mass.

SECOND CORPS AREA

514th C.A. (AA) 1st Lt. Christian E. Rugh, Jr.,
Scotia, N. Y.

THIRD CORPS AREA

523d C.A. (AA) 1st Lt. James M. Jackson, New
Salem, Penna.

FOURTH CORPS AREA

545th C.A. (AA) 1st Lt. George W. Howard, Vicks-
burg, Miss.

FIFTH CORPS AREA

535th C.A. (AA) Capt. Thomas B. Huestis, Indian-
apolis, Ind.

SIXTH CORPS AREA

61st C.A. (AA) (RAA) Capt. George L. Cooper,
Evanston, Ill.

SEVENTH CORPS AREA

960th C.A. (AA) Capt. Joseph E. McMullen, Great
Bend, Kan.

EIGHTH CORPS AREA

969th C.A. (AA) Capt. James E. Breland, College
Station, Tex.

NINTH CORPS AREA

977th C.A. (AA) Capt. William D. Greenlee, Los
Angeles, Cal.

In addition to the saber engraved with his name, each winning officer also received a commendatory letter from the Chief of Coast Artillery, Major General A. H. Sunderland.

† † †

The 100% Roll Grows Longer

1st Coast Artillery—Fort Randolph, Panama.
7th Coast Artillery—Fort Dupont, Del.
8th Coast Artillery—Fort Preble, Me.
9th Coast Artillery—Fort Banks, Mass.
60th Coast Artillery—Fort Mills, P. I.
63d Coast Artillery—Fort MacArthur, Cal.
64th Coast Artillery—Fort Shafter, T. H.
91st Coast Artillery—Fort Mills, P. I.
202d Coast Artillery—Ill. National Guard.
206th Coast Artillery—Ark. National Guard.
213th Coast Artillery—Penna. National Guard.
242d Coast Artillery—Conn. National Guard.
243d Coast Artillery—R. I. National Guard.
245th Coast Artillery—N. Y. National Guard.
248th Coast Artillery—Wash. National Guard.
250th Coast Artillery—Cal. National Guard.
Senior ROTC, University of California, Los Angeles.
Senior ROTC, University of Delaware.
Senior ROTC, University of Alabama.

In posting the current 100% regiments we had the pleasing task of adding six new units. Five of the newcomers hail from east of the Mississippi and are members of the civilian components. This is as it should be, for it

shows that the JOURNAL is more and more becoming the magazine to be relied on—not only for professional advancement but also for its coverage of events military around the world.

Reading from the top down, the first newcomer to the roll hails from the Philippine Islands—the 91st Coast Artillery (P.S.). Commanded by Colonel W. C. Koenig, the 91st has long been a standby of the JOURNAL and we are glad to bid them welcome to the select company of 100-percenters. Next to greet your eye is the 213th Coast Artillery, Pennsylvania National Guard. This regiment—our first acquisition in the Keystone State—has its headquarters at Allentown and is commanded by Colonel C. C. Curtis. Incidentally, Colonel Curtis has so arranged it that the subscriptions for the officers of his regiment are synchronized; they all expire on the same date and are all renewed at once. This is cooperation plus. The 213th recently said good-bye to a regimental commander when Colonel C. J. Smith retired after service that spanned forty years in the Pennsylvania National Guard at home and in action in France. The JOURNAL extends its greetings to Colonel Smith on his well-earned retirement.

The next regiment that is new to the 100% column is the 242d Coast Artillery, Connecticut National Guard. This organization makes its headquarters at Bridgeport and is commanded by Colonel Russell Y. Moore. We congratulate Colonel Moore and his officers for their presence in such good company.

The New York National Guard supplies the list with the 245th Coast Artillery, with headquarters at Brooklyn. The 245th is commanded by Colonel Charles G. Gleim, who has managed to combine thirty years of soldiering with his civil life job of engineering. A leader in his profession, he has been engaged in tunnel construction for the greater part of his career. He played a major part in the construction of the Holland Tunnel and is now in charge of the construction of the new Lincoln (midtown) Tunnel connecting Manhattan with New Jersey.

The credit for the Senior ROTC unit at the University of Delaware goes to Major R. W. Argo, P. M. S. & T. at that institution. Major Argo signed up every member of the Senior ROTC.

At the University of Alabama the good work was done by Major E. H. Underwood, who didn't quit until he had every member of the Senior unit signed, sealed, and delivered.

While we are on the subject of one-hundred percenters, we learn that one of the colonels of an honor regiment has received his star. He is General Richard E. Mittelstaedt, commanding general, 79th Infantry Brigade, California National Guard, and late CO of the 250th Coast Artillery. The 250th's new commander is Colonel David P. Hardy, second-in-command for many years and who served as an instructor in the department of gunnery at the Coast Artillery School during the World War. The JOURNAL not only congratulates General Mittelstaedt on his promotion, but it also felicitates Colonel Hardy on taking over a bang-up regiment.

General Gulick Retires

As we go to press General John W. Gulick, former Chief of Coast Artillery and Commandant of the Coast Artillery School retires by reason of reaching the statutory retirement age of 64 years.



General Gulick, who was born in Goldsboro, North Carolina, saw service in Cuba in 1898-99, during the Spanish-American War. In 1900-01 he was on duty in the Philippine Islands, during which period he participated in a number of engagements against insurgent forces for which he received several official citations. Among the highlights of his pre-war career are a second tour in Cuba (1900-23), service as military

attaché at Santiago, Chile, (1911-15), and duty at El Paso, Texas, during the Mexican border disturbance in 1916.

Soon after American participation in the World War General Gulick was detailed as chief of staff of the 40th Division, at Camp Kearney, California. From September, 1917, to December of the same year, he served on temporary duty in France. Returning to the United States he served with the 40th Division at Kearney until September, 1918, when he accompanied it to France. Shortly after arrival overseas, he was detached from the 40th Division, and during the St. Mihiel and Meuse-Argonne operations served as assistant chief of the operations section and later as chief of staff of the army artillery of the First Army.

From his exceptional work in the last-named capacity, General Gulick was awarded the Distinguished Service Medal. The citation accompanying the award reads:

For exceptionally meritorious and conspicuous services. As assistant chief of the operations section and later chief of staff of the Army Artillery of the 1st Army, he demonstrated a keen conception of the tactical situations which confronted the artillery of the 1st Army. By his high professional attainments and sound military judgment, he handled the many complex problems of the 1st Army Artillery with marked skill, and thereby contributed, in no small degree, to the success of this unit in the St. Mihiel and Meuse-Argonne offensives.

General Gulick has also received the Citation Certificate, National Order of the Legion of Honor (Officer) France, and the Order al Merito (Commander), Chile.

Since the World War, General Gulick's assignments have included a four-year detail with the War Department General Staff ending in 1924; executive of the Militia Bureau, 1926-30; and Chief of Coast Artillery, 1930-34. He commanded the Pacific Sector of the Panama Canal Department in 1934-35, and the Harbor Defenses of Manila and Subic Bays in the Philippines in 1935-36.

He has held the post of Commandant of the Coast Artillery School since the summer of 1936.

General Gulick's thorough understanding of the large coast and air defense problems of the United States has been of material help to the Coast Artillery Corps in achieving its present efficient set-up.

The JOURNAL salutes General Gulick on his well earned retirement, knowing that it voices the sentiments of the Corps at large in tendering him our appreciation for the many years he has devoted to our arm.

Election of Officers

The terms of office of three members of the Executive Council expire on December 31, 1938. Their successors are to be elected by ballot from among Coast Artillery officers. The present members whose terms of office expire are:

Brig. Gen. William Ottmann, N.Y.N.G.
Colonel W. S. Pollitz, CA-Res.
Colonel Clifford Jones, C.A.C.

To fill the three vacancies the President of the Association appointed a nominating committee to place the names of competent officers in nomination. The committee is somewhat restricted in its selections (even though there are many qualified officers) because of the desire to have as many members of the Executive Council as possible available for meetings in Washington. In order to have a quorum, which is essential for the conduct of business, at least five members of the Executive Council should reside in Washington or be available for meetings there. The nominating committee has submitted the names of the following officers for consideration:

Colonel Howard K. Loughry, C.A.C., War Department General Staff, Washington.
Colonel F. S. Clark, C.A.C., Ft. Monroe.
Lt. Col. E. B. Colladay, C.A.C., War Department General Staff, Washington.
Major T. J. Betts, C.A.C., War Department General Staff, Washington.
Colonel W. W. Burns, 260th C.A., D.C.N.G., Washington.
Colonel E. E. Gauche, 212th C.A., N.Y.N.G., New York.
Colonel C. C. Dawes, 202d C.A., Ill. N. G., Chicago.
Brigadier General R. E. Mittelstaedt, Calif. N.G., Sacramento, California.
Colonel J. B. Bentley, CA-Res., Laurel, Maryland.
Colonel Milo Brinkley, CA-Res., Washington.

It is especially desired to impress upon all members of the Association that they are not required to accept the selections of the nominating committee and that they are free to make substitutions and to vote for any officer of their choice. If any member does not approve of the committee's recommendation he should enter his personal

choice on the ballot in the space provided for that purpose.

Printed ballots will be distributed about December 1, 1938. Normally, they will not be sent to individuals, as this has been found to be impractical, but they will be sent through regimental and post commanders, National Guard instructors, instructors of the Organized Reserves and similar agencies. It is urgently requested that individuals accomplish the ballots and return them to the agency from which they received them, and that these agencies forward them promptly to the Secretary of the Association. In case a member of the Association should fail to receive a printed ballot it is requested that he record his vote informally. A copy of the printed ballot, which will be mailed out, appears on page 506. Ballots should be mailed in time to reach the Secretary of the Association prior to January 4, 1939. They cannot be counted if received after that date.

In expressing at this time our appreciation to the retiring members of the Executive Council, we are mindful of the sacrifices made by them to further the work of the Association. Their helpful suggestions affecting policies, and their willingness at all times to render every possible assistance, has in measurable degree contributed to whatever success and progress the Association and the JOURNAL have attained.

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Prize Essay Competition

The judges are now at work determining the merits of the essays submitted in the 1938 Prize Essay Competition. They will shortly make known the results of their deliberations and we shall then announce the winners. Moreover, we shall publish the winning essay in an early number of the JOURNAL. Essays that receive honorable mention will also be published. You will recall that the first prize carries an award of \$200 and any essays that receive the honorable mention rating will receive an award of \$100.

The 1938 competition was extremely gratifying, arousing interest to the extent that it has been decided to continue the contest in 1939. The basic purpose behind this competition is the stimulation of thought and the creation of interest in current professional problems.

A detailed description of the provisions governing the contest appears elsewhere in an advertisement in this number.

It is especially desired to impress on all contestants the fact that the subject of each essay is to be selected by the author and his selection will be restricted in no manner. However, in order to aid those who may not have subjects readily in mind, the following are mentioned as desirable subjects on which essays may be written:

The rôle, organization, and training of AA artillery with a view to its employment with a field army.

AA intelligence service.

Aircraft warning service.

A system of beach defense.

Training methods for National Guard, Organized Reserves and R.O.T.C.

Proper weapon and organization for the AA machine-gun battalion.

Coast Artillery gunnery of today and the problems of long-range and indirect fire.

The value of mines in harbor defense.

National Guard spirit and the best means of maintaining efficient Coast Artillery National Guard regiments.

The mission of the Coast Artillery Organized Reserve in the event of an emergency, including its mobilization and assignment to station.

Tactical employment of railway artillery when operating with an army in the field.

On the assumption that a harbor of major importance is to be fortified, what would constitute an ideal defense?

The antiaircraft regiment: a discussion of an ideal organization and ideal armament, including guns, ammunition and fire control equipment.

Coast Artillery target practice: its purpose and how best to accomplish it.

The ideal types of weapons for seacoast defense.

✓ ✓ ✓

Air Raids and Manchester

The Socialist Party of the Manchester borough have evidently digested Professor Haldane's recent book, *A.R.P.*, for the proposals they have put forward for the safety of the city's population in the event of air raids conform closely to that which is advocated therein. Briefly, they consist of a system of bomb-proof, blast-proof, and trench shelters, together with the evacuation of the young, the blind, the old, the sick, and nursing and expectant mothers. The total cost is estimated at £7,500,000, and the ratable value of the borough is little short of that amount.

It is pointed out that the work would be adaptable for peace-time needs. The tunnels, for instance, would serve to relieve traffic congestion, while the evacuation centres would become holiday camps, rest homes, country hospitals, and convalescent homes. There is a something compellingly attractive in the idea of building up for peace while yet preparing for war.

—*United Services Review*, Sept. 29, 1938.

✓ ✓ ✓

New 37-mm. AA Gun

A highly effective weapon, designed to fight aircraft, has recently been removed from an experimental status and standardized for issue by the War Department.

Through an extensive period, the Army Ordnance Department has been engaged in perfecting defensive means against the airplane. In the ground defense against aircraft, gunnery in the higher altitudes has proven more satisfactory than that designed to defend against the high-speed, low-flying attack planes. The lack of an automatic weapon capable of going into action instantly and of de-



37-mm. Automatic AA Gun, M1, in Firing Position.

livering a heavy volume of fire with an explosive bullet was acute.

The new weapon is of 37-mm. caliber, automatic type, mounted on an all-around fire, four-wheel trailer which may be towed by a light truck at maximum speed. The unit has a wheelbase of 120 inches, with a 58-inch tread, and weighs about 5,000 pounds.

The weapon is influenced in design by the latest developments for armament of this character in actual operations. It is necessarily of intricate composition, and is typical of the time problem in procurement faced by the War Department in equipping our initial forces with modern and effective armament.

Further details as to characteristics and performance are, for the time, restricted.

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Italian Antiaircraft Defense

In Italy a very common-sense point of view is being taken about antiaircraft defense in time of war. It ap-

pears that municipalities, non-naval ports, industrial or commercial establishments, and any other institutions which it is desirable to defend outside those for which the Government bears a direct responsibility, are to be invited to supply, and pay for, their own guns, ammunition, and other devices against air attack. These will be served by local Militia units trained and earmarked for that special purpose. It is a frank admission that universal measures of active defense are beyond the powers of a Government, and here we might take a page from the Italian notebook.

The rates would go up, it is true, but the incidence of extra expenditure would be fairly distributed. There is nothing illogical about the idea, for in former days the citizens had often to provide their own defense against attack, and as the conditions of modern war, in their atrocity, are not approximate to those of medieval days, why not reproduce the atmosphere even more completely and replace the burden of security as Italy is doing?

—United Services Review, Sept. 29, 1938.

First AA Practice?

By STAFF SERGEANT HARRY R. BROWN, DEML (OR)
(Major, Infantry Reserve)

In these days of accurate antiaircraft weapons, sound locators, and scientific range-finders, an old Infantryman, like myself, is prone to look upon the members of the Antiaircraft Coast Artillery with something closely approaching awe. It is therefore somewhat consoling to look back to what I believe to have been the first antiaircraft firing held in our Army—perhaps in any army.

In the late summer of 1911 I was a student in the old School of Musketry at the Presidio of Monterey. At this school we carried on a great deal of experimental work, usually on our own time.

At that date few, if any, of the class had ever seen an airplane, but debate ran high as to the effect of such craft on warfare, and the possibilities of attack from the air and defense from the ground. Most of the instructors, and the class, agreed that planes would probably replace cavalry as scouts, the cavalry members freely dissenting.

This debate finally led to action, but action which was not, I believe, noted by the service at large. It was decided that we should have antiaircraft practice. But then the problem was, "What will we use as a target?"

After all hands had their say, it was decided to build "some kind of a kite." The result was a huge boxkite about ten feet high and four and a half feet wide. We made the frame of light wooden strips and covered it with 1,000-yard targets, and bound and braced the whole thing to-

gether by a system of stout strings strongly reminding one of the stays and braces on a full-rigged ship.

With Maxim-Vickers guns (Model 1909) and our trusty Springfields we sallied forth to out-Quixote Don Quixote! Up soared our pioneer antiaircraft target into California's skies. Then came a great crackling of rifles and a steady purr of Maxims and the first antiaircraft practice was on! But as I remember, we got three hits.

The alibi? Each man had to estimate his own range. The range-finder then in use was, in our opinion, useless on the level and more useless, if possible, for finding ranges to the skies. And we had to guess where the kite would be between the time we lined our sights on it and pulled the trigger. There wasn't time to squeeze.

If my memory serves me correctly, we lost our huge target, not by the efficiency of our fires, but by the force of a strong wind blowing off Monterey Bay. We also received some sarcastic comments from the school faculty. But at any rate, it was a beginning. It may not have been the first antiaircraft firing, but we believed it to be, and we honestly felt that we were initiating a new phase in warfare. And I like to think, as I have throughout the years, that it was a handful of Doughboys who first conceived of the future need for antiaircraft practice.

[Errors' Note: It was also in 1911 that during the Libyan Campaign in North Africa, Lieutenant Manzini of the Italian Army was killed by a rifle shot from an enemy native, while flying 300 feet above the hostile lines.]

♦ ♦ ♦

Bagging the Hedgehopper

It is believed that the tactics of using the maximum fire power of small arms (especially the rifle), properly dispersed, for AA defense, as discussed by Captain J. I. Greene, Infantry, in his article on page 472 are correct. Coast Artillery units use these tactics for their own defense and carry rifles for that purpose. There never will be enough antiaircraft artillery to cover all the troops and establishments that need antiaircraft protection. All units must have definite plans for their own defense, this defense when practicable to be supplemented by specially trained antiaircraft units. Therefore, the maximum use of the rifle and automatic rifle should be stressed.

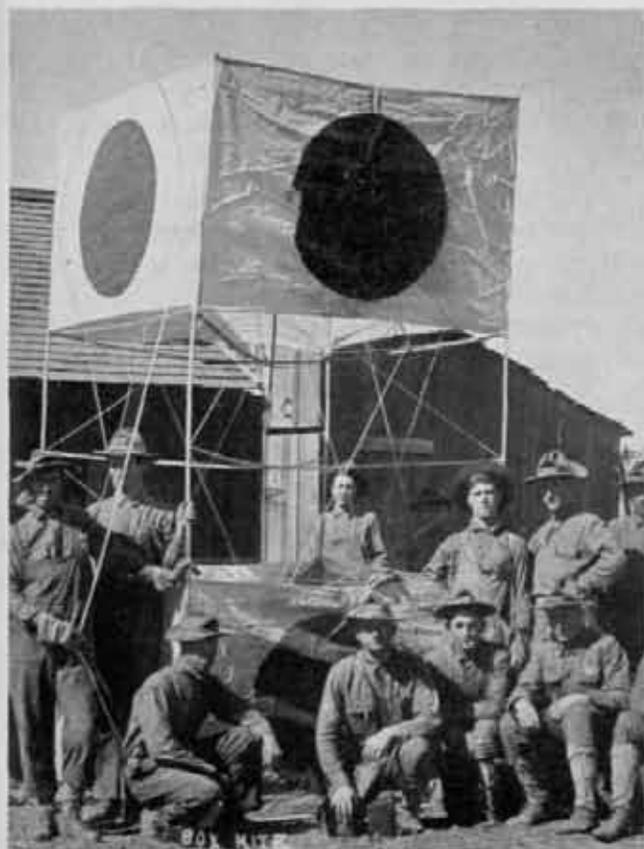
♦ ♦ ♦

Error in CA Memorandum No. 18

A typographical error has been noted in Coast Artillery Memorandum No. 18, July 1, 1938, *Results of Coast Artillery Target Practice, Calendar Year 1937*.

To insure that there be no misunderstanding as to the meaning of the comment appearing in paragraph 9 b (2) of this memorandum the following correction is published:

Page 5, line 7. Change "an attempt" to "no attempt," so that the sentence appearing on lines 6, 7, 8 and 9 will read: "Because of this, and also to obtain added simplicity in fire control no attempt has been made to provide this type of armament with a spotting system capable of furnishing the magnitude of deviations."



Coast Artillery Activities

OFFICE OF CHIEF OF COAST ARTILLERY

Chief of Coast Artillery

MAJOR GENERAL A. H. SUNDERLAND

Executive

COLONEL JOSEPH A. GREEN

Matériel and Finance Section

LIEUTENANT COLONEL H. B. HOLMES, JR.
MAJOR J. T. LEWIS
MAJOR S. L. McCROSKEY

Organization and Training Section

LIEUTENANT COLONEL D. D. HINMAN
MAJOR AARON BRADSHAW, JR.
MAJOR W. H. WARREN

Plans and Projects Section

LIEUTENANT COLONEL A. G. STRONG

Personnel

LIEUTENANT COLONEL K. T. BLOOD



Notes from the Chief's Office

Three small radio controlled airplanes have been ordered by the Chief of the Air Corps from the Reginald Denny Industries for use in connection with the development of a robot target for antiaircraft. These little planes have a wing span of about twelve feet. They are expected to contribute to the solution of some of the problems involved in producing robot targets of greater capabilities, suitable for use by antiaircraft artillery gun organizations.

• • •

The Fort Bragg exercises imposed very severe service on antiaircraft equipment. Some breakdowns occurred of course, but the weaknesses have been carefully noted and where necessary, changes in design will be prepared for future procurement. The manufacture of fiscal year 1939 searchlights has not yet been started so that changes found

necessary as a result of the experience at Fort Bragg will be incorporated in lights to be procured this year.

• • •

The single axle antiaircraft gun mount T4 and gun T9 was very favorably commented upon by antiaircraft experts at Fort Bragg. A few of these guns and mounts are being procured with fiscal year 1939 funds.

• • •

Prime movers for antiaircraft guns came in for much criticism at Fort Bragg. The Quartermaster General sent an automotive engineer to Bragg to accumulate all available evidence concerning the weaknesses of these vehicles. Careful study of these weaknesses will be made. It may be that new military characteristics for prime movers will be set up in order that vehicles better adapted to the requirements will be assured for future procurement.



Fort Monroe

BRIGADIER GENERAL F. H. SMITH, *Commanding*

COLONEL W. E. SHEDD, JR.
*Commanding Harbor Defenses of Chesapeake Bay
and 2d Coast Artillery (HD)*

COLONEL EUGENE B. WALKER
Commanding 51st Coast Artillery (TD)

CAPTAIN PERRY MCC. SMITH
Commanding 52d Coast Artillery (Ry)

By Major L. W. Goepfert

The months of September and October, usually more or less quiet once school activities are under way, proved rather strenuous this year. What with troops going and coming from Forts Bragg and Story and a reorganization of the harbor defenses to be effected on November 1st, life has been anything but dull.

PERSONNEL

General Gulick, who retires on November 30th, relinquished command of Fort Monroe on October 12th. General and Mrs. Gulick are temporarily located on the Roseland estate in Hampton, where their many friends often find occasion to visit them. We all wish the Gulicks many happy years in their well earned retirement.

Colonel Wm. E. Shedd, harbor defense commander and post executive, discards his eagles for a star on December 1st. All hands agree that the selection couldn't have been a happier one. Although no change of station orders have as yet been received we congratulate the personnel of the post to which the Shedd will soon be assigned.

General Frederick E. Smith will arrive at Monroe on or about November 20th to assume command. We are informed, via short-wave Panamanian grapevine, that we are again most fortunate in this assignment.

FORT BRAGG MANEUVERS

The Provisional Battalion (AA), 2d Coast Artillery, Major Paul French, commanding, returned from Fort Bragg after an absence of two months. The battalion, consisting of Batteries A, C, and Headquarters, 2d Coast Artillery and detachments from the Medical Corps, Ordnance Department and Quartermaster Corps participated in the joint antiaircraft-air corps exercises held at Bragg.

REORGANIZATION

Headquarters Battery and Battery D, 3d Battalion, 52d Coast Artillery, become inactive as of midnight, Oc-

tober 31st. The commissioned and enlisted personnel of these two units are transferred to two new units to be organized on November 1st: Battery B and D, respectively, of the 2d Coast Artillery. Battery B will man AA searchlights and D AA machine guns. The 2d Coast Artillery, as reorganized, will consist of:

Headquarters Battery
Battery A—submarine mines
Battery B—AA searchlights
Battery C—AA guns
Battery D—AA machine guns
Battery E—Caretakers, Fort Story.

Remaining units in the harbor defenses are:

Headquarters Battery and Batteries A and B, 51st Coast Artillery; 155-mm. GPF's. Battery F, 52d Coast Artillery; railway guns and mortars.

ATHLETICS

The post has concentrated on intra-mural athletics this past year and the results have been so satisfactory that withdrawal from Corps Area competition has been decided upon.

Headquarters Battery, 2d Coast Artillery, won the post baseball championship after a hectic season.

Inter-battery touch football has been substituted in place of the former post football and has proven highly popular. Instead of a squad of approximately twenty-five men on the post team several hundred have been able to participate on their respective battery teams.

Battery F, 52d Coast Artillery, won the championship, having been pressed all the way by the Medical Detachment.

Boxing will soon be inaugurated. Fort Monroe has two wins on the Corps Area Cup and needs a third to gain permanent possession. In the event that a Corps Area tournament is to be held this year, Monroe will probably enter a team in expectation of annexing the trophy.



Hawaiian Separate Coast Artillery Brigade

BRIGADIER GENERAL PHILIP B. PEYTON, *Commanding*

COLONEL ROBERT ARTHUR, *Chief of Staff*

MAJOR F. A. MACON, *Adjutant General & S-1*

CAPTAIN W. H. DUNHAM, *S-2 & Gunnery*

LIEUTENANT COLONEL W. D. FRAZER, *S-3*

LIEUTENANT COLONEL A. E. ROWLAND, *S-4 & War Plans*

CAPTAIN L. D. FLORY
Com. and Engineer Officer

CAPTAIN W. H. KENDALL
Sec. Ath. Officer

CAPTAIN S. E. WHITESIDES, JR.
Chemical Warfare Officer

LIEUTENANT W. A. CALL
Ordnance Officer

COLONEL H. C. MERRIAM
Commanding Harbor Defenses of Pearl Harbor

COLONEL F. P. HARDAWAY
Commanding 64th Coast Artillery (AA)

LIEUTENANT COLONEL F. E. GROSS
Commanding Harbor Defenses of Honolulu

By Captain Paul B. Kelly

TRAINING

Target practice scores as calculated by organizations and reported since our last letter.

64TH COAST ARTILLERY (AA)				
<i>(Gun Batteries)</i>				
<i>Organization</i>	<i>Practice</i>	<i>Day or Night</i>	<i>Altimeter or Height-finder</i>	<i>Score</i>
Battery K	1.	Night	Altimeter	196.0
	2.	Day	"	353.6
	3.	Day	Height-finder	272.9
Battery C	1.	Day	Height-finder	21.5
	2.	Night	Altimeter	238.5
	3.	Day	Height-finder	414.3
Battery B	1.	Day	Altimeter	302.5
	2.	Night	"	82.8
	3.	Day	Height-finder	282.9
Battery G	1.	Night	Altimeter	210.1
	2.	Day	"	248.4
	3.	Day	Height-finder	183.8
Battery F	1.	Day	Altimeter	111.2
	2.	Night	"	203.5
	3.	Day	Height-finder	197.5
Battery L	1.	Day	Altimeter	118.4
	2.	Day	Height-finder	55.7
	3.	Night	Altimeter	115.8

HARBOR DEFENSES OF PEARL HARBOR

Battery A, 55th CA (155mm TD)	90.5
" B, 55th CA (155mm TD)	140.5
" C, 55th CA (155mm TD)	103.2
Battery A, 41st CA (8" Ry)	61.6 (Old Table I values of P. E. used)
" 41st CA (8" Ry)	78.6
Battery A, 15th CA (16" BC) . . .	Experimental — No Score
" B, 15th CA (12" BC) . . .	158.7
" C, 15th CA (155mm fired as 16") . . .	148.1 and 118.7

Batteries A and E, 64th Coast Artillery (AA) are now in their final stage of training for antiaircraft searchlight target practice at their camp at Pearl City Peninsula. This will complete the annual service target practices for the entire brigade.

From November 1 to 15 the Brigade will be in war positions for minor joint exercises (MJX-38). The first

phase will include coöperative exercises with local Navy elements, the second phase with the Air Corps.

PERSONNEL CHANGES

Orders have been received assigning Brigadier General F. Q. C. Gardner to command the Hawaiian Separate Coast Artillery Brigade effective upon his arrival in the Hawaiian Department. General Gardner, accompanied by his aide-de-camp, Lieutenant Milan G. Weber, will sail from Charleston, South Carolina, on December 30 and will arrive in Hawaii on January 27. On that date Brigadier General P. B. Peyton leaves the H.S.C.A.B. and takes command of the 21st Infantry Brigade at Schofield Barracks.

The 64th Coast Artillery (AA) and the Harbor Defenses of Honolulu held Aloha Reviews and, with real regret, saw their commanding officers depart on October 6. Colonel Ralph M. Mitchell and Colonel George A. Wildrick left Oahu with the best wishes of the entire command. Colonel F. P. Hardaway, who recently received his promotion, commands the 64th Coast Artillery until his departure on November 12.

The retirement of Colonel H. H. Acheson at the Harbor Defenses of Pearl Harbor on October 31 deprives the Coast Artillery of one of its ablest and best beloved officers. Colonel Acheson intends to make his home here temporarily.

Colonel Sanderford Jarman will arrive for duty on December 16.

ARRIVALS AND DEPARTURES

Departed October 6th: Colonels G. A. Wildrick and R. M. Mitchell, Captains L. G. Ross and A. N. Ziegler, Lieutenants Paul Elias, H. F. Turner, R. A. Pillivant, J. T. Barber, E. F. Heidland, and F. M. Goldrick.

Arrived October 6th: Majors Geo. Blancy (Hon) and F. L. Topping (64th), Captain W. I. Brady (PH), Lieutenants W. W. Bailey (PH) and O. B. Steely (PH), and Captain W. K. Noel (JAGD) (HSCAB).

Arrived November 7th: Lieutenant Colonel J. H. Lindt (HSCAB), Lieutenants Eubank (Hon) and Kopcsak (PH).

SPORTS

Since the end of the baseball season, the Brigade and the Honolulu Sector have been concentrating on swimming and tennis. As a result of the dual-meet swimming season, the Harbor Defenses of Pear Harbor retained the swimming crown by defeating, in turn, the Harbor Defenses of Honolulu, Luke Field, and the 64th Coast Artillery—all by decisive scores. In the individual meet held at the Army and Navy Y.M.C.A. at the close of the season, Vande Vorde of the Harbor Defenses of Honolulu won the high-point trophy with ten points. He was pushed hard for the honor by Coull of the Harbor Defenses of Pearl Harbor, who scored nine points for second place.

The Honolulu Sector dominated the Hawaiian Department individual and team tennis matches held at Fort Kamehameha during the latter part of September. In the team matches, the officers' and enlisted men's teams won 13 of the 18 matches played with Schofield Barracks. In the individual matches Honolulu Sector players played in the finals of both singles and doubles. Lieutenant Dolf Muehleisen, Air Corps, Luke Field, who is the Island open champion, defeated Sergeant Veldon Rogers of the Harbor Defenses of Honolulu to retain the Army singles

championship, and Lieutenant Muchleisen, teamed with Lieutenant Thatcher of Luke Field, defeated the Pearl Harbor team of Staff Sergeant Elmer Twining and Corporal John Roberts for the doubles championship. The Sector Tennis Team was managed by Captain Robert Tomlin, 41st Coast Artillery, who has been kept out of active competition by an infected hand. Captain Tomlin is under orders to leave the Department in December.

Inter-battery basketball leagues have swung into action at all of the Brigade and Sector posts and enthusiastic and closely contested fights are indicated in both inter-battery and inter-post leagues. Unit teams in the Sector-Navy Basketball for 1938-39 are as follows:

Harbor Defenses of Honolulu
 Harbor Defense of Pearl Harbor
 64th Coast Artillery
 Luke Field
 Staff
 Submarine Squadron Four
 Patrol Wing Two
 Marine Barracks
 Naval Hospital
 Mincraft Battle Fleet



The Coast Artillery School, Staff and Faculty, 1938-1939

Rear Row: Captains Lemnitzer, Merritt, Kane, Pamplin, Vanderluis, Stevens, Holcomb, Lieutenant Russell, Captain Chester.
 Second Row: Majors Dennis, Griggs, Cochran, McNeely, Morrison, Lewis, Paul (A.C.), Captain Hartman.
 Front Row: Lieutenant Colonels Nichols, Pendleton, Poland (Inf.), Cox, Brigadier General Gulick, Lieutenant Colonel Robison, Majors Trigg (Cav.), Foltz, Lowry.
 Absent: Lieutenant Colonel Cramer, Major Handwerk.

Corregidor

BRIGADIER GENERAL WALTER K. WILSON, *Commanding*
COLONEL T. A. TERRY, *Executive*

COLONEL GEORGE RUHLEN
Commanding 59th Coast Artillery (HD)

MAJOR JOHN H. HARRINGTON
Commanding 60th Coast Artillery (AA)

COLONEL WILLIAM C. KOENIG
Commanding 91st Coast Artillery (PS) (HD)

LIEUTENANT COLONEL ALBERT H. WARREN
Commanding 92d Coast Artillery (PS) (TD)

By Major R. E. Phillips

During August and September interpost activities have contributed a number of interesting highlights. A six-man officer golf team from Fort McKinley dropped in on August 3d and gave a convincing demonstration of superiority in golf ball ballistics. The cavalry took their turn when our team visited Fort Stotsenburg, August 26th and 27th. The deflating process reached its climax September 18-19. Contingents of twenty golfers from Mills, Stotsenburg and the Post of Manila converged on Fort McKinley. Foursomes consisting of one player from each post were organized and it was each man against the other three. As hosts and as golfers McKinley turned in another superior performance.

The week end at McKinley was further enlivened and made interesting by the presentation Saturday night of *The Whole Town's Talking* by visiting talent from Stotsenburg and by a musicale on Sunday afternoon which featured our own Mrs. Walter K. Wilson in accomplished and pleasing solo offerings. As to golf—when it was all over McKinley had most of the points and we had most of the fun.

Finally, during the week end of September 25-26 an aggregation of twenty of our younger officers and ladies invaded the Manila Polo Club and brought back victories in badminton, bowling and volley ball. The soft ball contest alone went to the home club.

Under the leadership of Mrs. Walter K. Wilson, Corregidor has produced a church choir of which we may well be proud. It includes about twenty regular members, many with trained voices. The interest aroused led recently to the organization of an officers' glee club of twelve members.

Lieutenant Colonel John H. Hood and Mrs. Hood have departed for the Netherlands Indies on leave prior to boarding the October 31st transport. Lieutenant Colonel James B. Crawford, formerly harbor defense inspector, has gone to the 59th Coast Artillery. The two vacancies created are being handled temporarily by Lieutenant Colonel Edward O. Halbert.

We have been hoarding our space quota in order to relate a fish story vouched for by First Lieutenant Lazar, commanding Battery E, 59th Coast Artillery, stationed at Fort Drum. Quote: "About 9:00 AM, September 3, 1938, the watch observed a sword fish, close in to Drum, chasing a school of taliquita at high speed. After a momentary disappearance the fish was sighted floating on his back apparently stunned so two experienced fishermen Sergeant Hudlow and Corporal Kirk Miller lowered the power banca and secured the denizon of the deep while

he was still incapacitated. Inspection showed about one-third of the sword missing—a fresh break so we conclude he accidentally collided with the ship and so knocked himself out. He weighs between six and seven hundred pounds, measures nine and one-half feet tip to tail and is thought to be of the Marlin family."

59TH COAST ARTILLERY

Since our last letter, Colonel Crawford and Colonel Halbert have traded places. Colonel Halbert left the regiment to join the staff at harbor defense headquarters, while Colonel Crawford has taken his place with the troops.



Antiaircraft machine-gun firing has gone well. Using the Morgan Sight for individual gun tracer control, the firing batteries have turned in very creditable scores.

We took the inter-regimental duck-pin series from the 60th Coast Artillery, with the score 5-2.

On September 14th, this regiment celebrated regimental day. The assembled regiment observed a brief ceremony in which the newcomers were told—and the oldtimers reminded—of the regiment's history, the significance of its colors and emblems, and the traditions handed on to us by the men who have gone before. In the course of these ceremonies, Brigadier General Walter K. Wilson, presented to our regimental commander, Colonel George Ruhlen, the U. S. Coast Artillery Association trophy for the year 1937.

After the formal part of this celebration, Captain Kleinman took charge and, with the help of several soldier performers, put on a series of stunts. He gave us skits, songs, instrumental music, sleight-of-hand, music from a beer-can fiddle, dancing, a monologue, and finished off with mass singing. The program was a huge success, and we seize this opportunity to make a widespread public announcement of our thanks to Captain Kleinman and the men who put this entertainment across.

The batteries all served holiday dinners. General Wilson and the field officers of this regiment joined Battery B (Mess Sergeant Alexander Cecco) for these festivities. There was good food, good talk, and the good feeling that comes when men meet with their feet under a dinner table. Later, there were afternoon movies, exclusively

for the men of this regiment, and the day ended with a dinner dance for the officers and their families.

Another strictly regimental affair was the smoker of September 13th. Some of our boxers looked good especially those from Fort Hughes. The winners will go on to meet increasingly stiffer competition, and we hope to be able to report good news of them in our next letter.

60TH COAST ARTILLERY

Changes in personnel during August and September have been few but important. On September 14, 1938, the 60th gave a farewell dinner to Colonel and Mrs. James H. Cunningham who left the regiment on September 19th, on a month and a half terminal leave in India. On their return they will take the October 31st transport for the United States, where Colonel Cunningham will report for duty with the Organized Reserves in Los Angeles. The kindly interest of Colonel and Mrs. Cunningham in the life of the regiment will be missed by all. Captain and Mrs. E. G. Martin were also the guests of the regiment at the regimental dinner. Captain Martin is completing a very successful tour of foreign service as commanding officer of Battery B. They depart shortly on terminal leave prior to sailing on the October 31st transport, destination Fort Monroe. The best wishes of the regiment go with Colonel and Mrs. Cunningham and Captain and Mrs. Martin.

Other news of importance is the arrival, on September 9, 1938, of 4th Lieutenant Charles W. Hill, Jr., to 1st Lieutenant and Mrs. Charles W. Hill and on September 14th, 4th Lieutenant James W. Romlein to 2d Lieutenant and Mrs. John W. Romlein.

Basketball and bowling (duck pins) have been the athletic mainstays for the past two months. In the 60th Battery Duck-Pin League, Battery A nosed out Headquarters Battery by one match and took the cup. Batteries B and D were pushing the two leaders all the way. The Philippine Department Tournament and Bowling Congress was held at Fort Mills, September 24th-30th.

In connection therewith the 60th cites for honors, Corporal Matuszak, Battery D, who won high single 235, high triple 672, the "All Events" 1835, and the two-man congress. Paired with Sergeant Sabata, Battery B, the joint efforts produced a score of 1,174.

The 60th inter-battery basketball league is in the home stretch, with Battery A out in front. The schedule will be completed October 1st.

Boxing will shortly take the place of bowling in the athletic world. The 60th boxers are hard at work getting in shape for the regimental smoker on October 12th. Our candidates for the regimental team to meet our ancient rivals, the 59th, will be picked from these men.

In addition to the usual training to keep the 60th in readiness to fulfill its various defense missions, gunners' examinations have been completed, with a high percentage qualifying.

On August 26th, a group of officers from the 60th visited the 45th Infantry at Fort McKinley, where the

45th demonstrated their training methods in firing on aerial targets. The visit was interesting and instructive and a number of ideas were brought back for use in our own training.

On September 18th, a group of twenty-three officers from the 45th Infantry arrived at Fort Mills to observe antiaircraft machine-gun firing and to inspect the training methods of the 60th Coast Artillery. On September 19th the Guard Battalion of the 92d Coast Artillery (PS) gave a two-hour demonstration of antiaircraft machine-gun firing for them. Following this the 60th staged a demonstration of caliber .50 machine guns and the training methods used. An inspection of gun and searchlight training methods of the 60th completed the day's program and was followed by lunch at the Corregidor Club at which the 45th Infantry officers were the guests of the officers of Fort Mills. The visiting party left on the afternoon boat for Manila.

91ST COAST ARTILLERY (PS)

Troops schools for officers and enlisted men and gunners' instruction and examinations were concluded during this period.

All batteries have finished the rifle firing and are now preparing for antiaircraft machine-gun and beach defense firings.

During August and September, 91st athletics centered around duck pins and basketball. The inter-regimental duck pin and basketball championships went to Battery G, Captain Allison R. Hartman, commanding. By winning these two championships, Battery G took first place in the race for the regiment's "Athletic Supremacy" Trophy. Outstanding in the inter-regimental duck pin championship was the bowling of Sergeant Macadaeg, Battery G, who won high single (156), high triple (379) and high average (111).

The 91st dropped the post duck pin championship (Scout Division) to the 92d, but made up for this defeat by taking second place in the duck pins during the department tournament.

The department bowling tournament held at Fort Mills was the highlight of this period. The 91st made an excellent showing, taking first place in the ten pin and second place in the duck pins. First Sergeant Edrozo, representing the 91st Bowlers, received the department trophy from General Walter K. Wilson at the post cine on Sunday morning, October 2d.

The regimental basketball and boxing teams are now being organized and the prospects for a successful season are very bright. Fifteen of the regiment's best basketeers are now being tutored for a hard and long season which starts on October 8th with the 45th Infantry here at Fort Mills. The boxers, under the coaching of Private Binsol, Battery E, and the training of Corporal Baraan, Battery E, should steal the show for the next two months.

92D COAST ARTILLERY (PS)

Just completed: Regular small-arms firing both in rifle

and pistol and on balloon target. We are now firing anti-aircraft machine-gun practices at towed targets.

After completion of the anti-aircraft machine-gun firing, the batteries will train in preparation for the coming beach defense firing scheduled to be held during November.

Bowling: In the inter-battery bowling tournament in duck pins just completed, Battery B won the championship.

For the first time in many years, the 92d Regimental Bowling Team in Duck Pins, defeated the 91st Coast Artillery (PS) in the post championship games in the Scout Division.

Basketball: Battery C won the championship in the inter-battery league without a loss.

In the three game series between the winning battery teams of the 91st Coast Artillery (PS) and 92d Coast Artillery (PS), Battery C won the post championship by defeating Battery G of the 91st Coast Artillery (PS) in two successive games, the first time since 1935, al-

though the 92d Regimental Team won the post championship from the 91st during the past two years.

The 92d Regimental Team has been entered in the Philippine Department Basketball League which is scheduled to begin October 8th.

Arrivals: During the last week in September, 1938, the regiment was augmented by the arrival of Miss Patricia Lyn Cordes, daughter of Lieutenant and Mrs. Clifford F. Cordes, Jr.

Captain Pacifico C. Sevilla, PS, has just been relieved from duty with the Commonwealth Government of the Philippine Islands and is expected to arrive in the post with his family in the near future.

Departures: First Lieutenants William F. McKee and Robert M. Hardy departed on thirty days' leave of absence to visit foreign countries on October 3d and are expected to return from leave on or about the 23d. They are scheduled to return to the United States on the October 1938 transport.

It was with genuine regret that the regiment loses the services of Lieutenants McKee and Hardy.



West Point

With the resumption of the fall and winter social calendar the new Coast Artillery arrivals were tendered a welcoming reception at the Officers' Club. Music was supplied by a selected orchestra from the band, and food and refreshments were abundant.

Of the thirty-eight Coast Artillery officers now on duty at West Point, new arrivals this year include: Major C. H. Armstrong, assigned to Headquarters; Captains William I. Allen and William L. McPherson, Department of Chemistry and Electricity; Captain John A. McComsey, Department of Law; Lieutenant Edwin G. Griffith, Department of Modern Languages; Lieutenants Dwight B. Johnson and John J. Lane, Department of Philosophy; Lieutenant Robert C. Leslie, Department of Mathematics; and Lieutenant Harvey J. Jablonsky, on duty with the Army Athletic Association.

Many new facilities and improvements were opened for use this fall. One of the most outstanding is the new "air-conditioned" press box at Michie Stadium, which, in addition to accommodating the many football scribes and radio announcers, provides sheltered seats for all field officers. Considerable jesting was heard from the lower ranks at this new deference to "R.H.I.P." but junior officers have also benefited by the change. The space provided by the press box is a new and additional area on the

hill behind the original stadium wall. Thus, with field officers now ensconced opposite the fifty-yard line, junior officers have moved to sections which are also nearer mid-field.

The new cadet barracks and academic building are also open and occupied. Incidentally, too, in regard to barracks, the tactical department has taken steps to rotate the comforts of the new and luxurious rooms. Companies which last year roughed it in austere old Central Barracks (South Barracks to you old-timers) have interchanged with companies who had begun to think they had a permanent lease on sumptuous new quarters. You flankers who once clattered up and down the iron stairs in the First Division will be interested to learn that the inevitable runts have taken over your old rooms. And if that travesty is not enough, you old members of the Milk Battalion can ponder those new barracks over in North Area, where there are tile latrines and showers on every floor!

Other changes of note in the Corps include: a return to the old custom of not carrying rifles while walking punishment tours; and a removal of corporal's chevrons from yearling sleeves. Once again all corporals are made in the second class; all cadet officers and sergeants are made in the first class.

Panama Canal Department

COLONEL EDWARD A. STOCKTON, JR.
Department Artillery Officer

COLONEL EDWARD W. PUTNEY
*Commanding Harbor Defenses of Balboa and
4th Coast Artillery (AA & HD)*

COLONEL WILLIAM T. CARPENTER
*Commanding Harbor Defenses of Cristobal and
1st Coast Artillery (AA & HD)*

LIEUTENANT COLONEL OLIVER L. SPILLER
Commanding Fort Randolph

Fort Amador

By Captain John H. Kochevar

When the *Republic* sailed on October 28, it took from us not only our sector commander, General F. H. Smith, but also our post commander, Colonel Forrest E. Williford. General Smith assumes command of the 3d Coast Artillery District at Fort Monroe, and Colonel Williford goes to command Fort Hancock. The regiment regrets their departure and extends to them our best wishes for a pleasant and successful tour of service at their new commands.

TRAINING

During the past two months the object of our training schedule has been the completion of gunner's instruction and the holding of the regular troop schools for both men and officers. Officers' school has been held weekly for discussion of various phases of harbor defense. The material presented by the various officers conducting the weekly conferences has proved invaluable in giving the students a more detailed knowledge of the various defenses, their objects, values, and accomplishments.

SPORTS

The post boxing tournament is finished with Battery C, commanded by Captain O. A. Nelson, coming out on top. Battery G, commanded by Captain Grinder had the highest percentage of contestants in the tournament. Both batteries were awarded trophies for their excellent work. In the first sector boxing program, Fort Amador got off to a good start.

The battery baseball league is in full swing and at the present it is impossible to predict the winner as all teams are evenly matched.

PERSONNEL

Other departures on the *Republic* are Captain John Reiersen, Captain R. A. Grinder and Lieutenant Harley C. Parke, all assigned to Fort Monroe. Captain William Niethamer and Lieutenant Andrew Samuels left in September for their new stations, Captain Niethamer going to Fort Barrancas and Lieutenant Samuels to Fort H. G. Wright. We are happy to welcome Lieutenant Colonel Chipman who has been made post exchange officer; Major Hayden commanding 1st Battalion and Captain J. W. Davis commanding Battery B.



Regular Class, Coast Artillery School, 1938-1939

Rear Row: Lieutenants Moorman, Nelson, Ogden, Peca, Piram, Powell, Ratcliffe, Stevens, Wolfe, Taylor, Thorlin, Tubbs, Voehl, Williams, Sutherland.
Second Row: Lieutenants Gerhardt, Giffin, Glassburn, Green, Hackman, Hain, Hoffman, Kenerick, King, Matteson, McReynolds, Mellnik, Mitchell, E. W. Moore, R. W. Moore.
Front Row: Lieutenants Ball, Chace, Cooper, Crawford, Ebel. Captains Sturman, Earnshaw (U.S.M.C.), Parks (U.S.M.C.), Price (U.S.M.C.), Wilson, Lieutenants Ebey, Edison, Fernandez (Phil Army), Finkenauer, Fritz, Gallagher.

Coast Artillery Board Notes

Any individual, whether or not he is a member of the service, is invited to submit constructive suggestions relating to problems under study by the Coast Artillery Board, or to present any new problems that properly may be considered by the Board. Communications should be addressed to the President, Coast Artillery Board, Fort Monroe, Virginia.

THE COAST ARTILLERY BOARD

COLONEL WILLIAM S. BOWEN, C.A.C., *President*
MAJOR GORDON B. WELCH, Ordnance Dept.
MAJOR FRANKLIN E. EDGECOMB, C.A.C.
MAJOR HUGH N. HERRICK, C.A.C.

CAPTAIN ROBERT H. KREUTER, C.A.C.
CAPTAIN CORTLANDT VAN R. SCHUYLER, C.A.C.
CAPTAIN CHARLES E. SHEPHERD, C.A.C.
CAPTAIN EDWIN W. CHAMBERLAIN, C.A.C.

COWEN TRAINER FOR SOUND LOCATION LISTENERS (PROJECT NO. 1122). The test model of the Cowen Trainer was described in this section of the COAST ARTILLERY JOURNAL for May-June, 1938. As part of its test by the Coast Artillery Board, the device was issued to Battery A, 2d Coast Artillery and was used throughout the past training season by that organization for the preliminary training of sound location listeners. After a little experience on the part of the trainer-operators it was found possible to simulate long smooth tracking courses, with sound volume and timbre closely resembling the corresponding sound qualities of an actual airplane. Training was made progressive as the listeners became more expert, by using a decreased sound volume and by introducing the noise of an automobile motor or other extraneous sounds into the background. Listeners were trained on sound locators of both the M1A8 and of the present standard M2 (Sperry) type. The tests were believed to have demonstrated the serviceability and adequacy of the trainer in essentially its present form.

Further investigations were conducted with a view to combining the Cowen Trainer and the Binaural Trainer M1 into one training device. The phonograph turntable and magnetic pick-up with the Cowen Trainer were found to be interchangeable with the turntable and pick-up in the Binaural Trainer M1. Consequently, the Board recommended the adoption of a new training device, to consist of the Cowen Trainer, essentially as represented by the test model, together with the phase control mechanism, helmets, book of records and accessory tools and equipment of the present Binaural Trainer M1, with suitable connections to permit of its being plugged into the phonograph pick-up of the Cowen Trainer.

The basis of issue of this new training device will be the same as the present basis of issue for the Binaural Trainer M1, except that those organizations already equipped with the M1 instrument will be furnished only such parts of the new device as are included in the test model of the present Cowen Trainer.

SPECTACLE BINOCULARS. Through the courtesy of the Engineering Board a pair of spectacle binoculars was turned over to the Coast Artillery Board informally, for test in connection with AA searchlights as an aid to the controller operators. The binoculars are 3.25 power and have 7½" field of view. Each eyepiece can be focused individually, and the interpupillary distance is adjustable. Large self-adjusting nose rests and conventional bakelite temples, together with very lightweight construction, make these binoculars very comfortable. The instrument is a standard commercial product, known as the Wallensak Allscope, and is of the type commonly worn by sports fans.

Though the Allscope possessed several desirable features it was not considered suitable for searchlight work because of the restricted field of view. Also, too much stray light seemed to enter the eye about the rear of the scope, especially when the searchlight was to the flank of the operator.

The Board concluded that the Wollensak Allscope does not possess sufficient advantages over the naked eye to justify its use in connection with antiaircraft artillery searchlights.

MOTOR VEHICLE DEFECTS. During the period September 26 to October 1, 1938, Mr. Robert F. Brown, Assistant Chief Engineer, Holabird Q.M. Depot, visited the various AA regiments at Fort Bragg for the Joint Exercises and investigated defects in motor vehicles purchased by the Quartermaster Corps for the Coast Artillery. Mr. Brown conferred with the various regimental commanders, motor transport officers and battery commanders concerned in order to develop all motor vehicle defects which had come to light. After his investigation at Fort Bragg, Mr. Brown visited Fort Monroe and conferred with members of the Board and faculty members of the Coast Artillery School.

On the trips to Fort Bragg serious defects developed in several vehicles. Some 7½-ton, 6 x 6, prime mover trucks developed vapor locks in the fuel lines which were espe-

cially troublesome in warm weather. The greatest contributing cause was found to be the location of the fuel pump on the exhaust side of the engine.

Some storage batteries located under the driver's seats were discharging noxious fumes into the driver's compartment.

Transfer case shifting control assemblies on some 6 x 6 trucks were found difficult to operate. It was found that the main trouble with the controls was improper operation at the hands of the operators due to the fact that inadequate instruction data had been supplied.

Certain defects showed that 7½-ton prime mover trucks were being allowed to coast down hill at excessive engine speeds. Coasting speeds of twenty-five to thirty miles per hour are not excessive but, in the case of this vehicle, result in the engine being turned over at a speed as great as 2,930 revolutions per minute. Certain engines should not exceed about 1,800 revolutions per minute. A chart is being compiled to show maximum coasting speeds in all gear ranges, and copies will be sent to every regiment.

Several failures of steering universal joints were reported on some 2½-ton, 4 x 4 trucks. Organizations concerned were informed that an unusual failure of joints will not result if they are not cramped beyond thirty degrees. A bulletin completely covering this subject will be compiled by the Quartermaster General and supplied to every regiment.

The regiments generally reported the following defects as existing in a certain, 2½-ton, 4 x 2 truck:

- a. Failure of composition timing gears.
- b. Aluminum cylinder heads unsatisfactory because of corrosion.
- c. Engines run too hot.

Among defects general in the transportation throughout the regiments were:

- a. Upholstery stains operator's clothes in hot weather.
- b. Wooden bodies are not as satisfactory as steel.
- c. Bumper heights are not the same on different types of vehicles.

Mr. Brown reports that steps are being taken to require the manufacturers to correct all defects as far as possible and that the Quartermaster General will take remedial action on defects remaining.

Based on the report of Mr. Brown, it seems probable that the Commanding Officer of the Holabird Quartermaster Depot will recommend procurement of a somewhat smaller experimental prime mover for the 3-inch AA gun to be tested by the Coast Artillery Board. In the purchase of this vehicle an effort will be made to have eliminated all defects thus far discovered in the present prime movers.

RANGE CORRECTION BOARD CHARTS. The Coast Artillery Board recently, in connection with the construction of experimental fire control equipment, has made use of a translucent plastic material manufactured under the trade name of Dilophane. This material is built up by a process of laminating several layers of paper, impregnated

with a resinous compound, under heat and pressure. In the process of manufacture it is possible to imbed charts and scales between laminations so that the scales and graduations are clearly visible.

The Board is of the opinion that the use of Dilophane in mounting fire control charts may offer several advantages over the paper charts now in use, such as protection from weather and dampness, protection from insects of the water-bug type, and greater accuracy in use.

With a view to determining whether the use of Dilophane is advantageous, the Board, with the approval of the Chief of Coast Artillery, has had four range correction board charts mounted in Dilophane and issued to two batteries at Fort Monroe, Virginia, and two in the Panama Canal Department.

These charts are to be mounted on Range Correction Boards M1905 (Pratt), and subjected to normal use for approximately one year.

PANORAMIC TELESCOPE T2 (PROJECT No. 1137). The optical deficiencies of the old panoramic telescopes for 155-mm guns have precluded firing this type of armament by direct pointing except at the shorter ranges. Efforts to improve the 155-mm sighting equipment have resulted in the standardization of a telescope mount M4 (degrees) or M6 (mils) and the furnishing of two optical instruments, the panoramic telescope for Case III pointing and the telescope M1909A1 for Case II pointing.



Figure 1
Panoramic Telescope T2 with Telescope Holder.

Reports from the service indicate that this new pointing equipment is quite satisfactory. There are, however, two features which have caused a continuation of efforts to develop a single all-purpose telescope. The undesirable features are:

- a. Cost of two instruments.
- b. In order to shift from one method of pointing to the other, one sight holder must be demounted and another bolted on, which results in the loss of considerable time.

Some consideration has been given to the development of a telescope suitable for Case II pointing which is provided with a mirror system capable of being shifted in and out of line of sight at will, thus permitting indirect aiming. After some study, the proposed mirror telescope was found to be too complex and difficult to construct as well as unsuitable for use in the field. Further development along this line was then dropped.

The Panoramic Telescope T2 (Figure 1) which was furnished the Coast Artillery Board for test is similar to the old panoramic telescope. It differs, however, by being

somewhat larger; has improved mechanical features; and has a six-power optical system.

The tests conducted by the Coast Artillery Board consisted mainly of using the Panoramic Telescope T2 in long range target practices employing Case II pointing. These tests demonstrated that the subject telescope was the equal of the Telescope M1909A1 as far as the direct pointing of 155-mm guns is concerned.

A study was made to determine whether some means could be provided which would permit the use of either Case II or Case III without the necessity of reorienting the telescope in case of a shift from one method to the other. Such provisions appeared to be feasible by the addition of a separate micrometer scale and minor changes to the indices of the horizontal mil scale.

The Coast Artillery Board recommended that the Panoramic Telescope T2, modified to provide both Case II and Case III scales and provided with lamp sockets for night lighting, be standardized as an all-purpose telescope replacing the old panoramic telescope and the Telescope M1909A1.



Special Class, National Guard and Officers Reserve Corps, Coast Artillery School, 1938-1939

Rear Row: Lieutenants DeRita, May, Jones, Wood, Nelson, Galloway, Mandell, Bettge.

Second Row: Captains Foxworth, McKibben, Grendon, Campbell, Lieutenants Nance, Edquist, West, Captain Newman, Lieutenant Evans.

Front Row: Captains Boyes, Zartarian, Olvis, Wright, Fegan, Winters, Schutte, Finnegan, DeHart, Garrett.

The Contributors

LIEUTENANT R. R. ARNOLD, Corps of Engineers, a native of New York, graduated from the Military Academy with the class of 1932. He is a graduate of the Engineer School Company Officers' Course (1937) and holds the degree of M.S. in C.E. awarded by the University of California (1936). Lieutenant Arnold is on duty at Fort Belvoir, Virginia.

✓ ✓ ✓

LIEUTENANT COLONEL A. C. M. AZOY, Coast Artillery Corps Reserve, a member of the Princeton class of 1914, saw service in the World War as a lieutenant of Coast Artillery. He lives in New Jersey, commuting daily to New York City where he is a member of the staff of a publishing house.

✓ ✓ ✓

COLONEL J. B. BENNETT, Coast Artillery Corps Reserve, enlisted for the World War at Fort Winfield Scott in August, 1917. After reaching the grade of sergeant major (junior grade) he was ordered to the Third Officers' Training Camp at Fort Monroe, winning his commission as second lieutenant, CA-ORC in March, 1918. After service at Fort Monroe and in the office of the Chief of Coast Artillery he was honorably discharged with the grade of captain in March, 1919. Shortly afterward he was appointed a major, CA-Res and reached his present grade in 1934. Colonel Bennett's assignment is with the AA defenses of Philadelphia. In civil life he is connected with the Curtis Publishing Company in charge of branch sales offices throughout the United States.

✓ ✓ ✓

STAFF SERGEANT H. W. CONKLIN, Coast Artillery Corps, is a native of New Jersey. He entered the army in 1915 as a cavalryman, and served in Mexico with the Punitive Expedition. Ordered to the 4th Engineer Training Camp in April, 1918, he was commissioned second lieutenant, Corps of Engineers, in July of that year. Assigned to the 114th Engineers, 39th Division, he accompanied that unit to France, returning to the States in August, 1919. After being mustered out, he spent the next seven years as an architectural draftsman and lumber salesman, returning to the army in 1927 when he enlisted in the Coast Artillery Corps. After graduating from the master gunner's course with honors in 1928 he was promoted to staff sergeant in April, 1929. He is now assigned to duty with the Coast Artillery

Board. Sergeant Conklin holds a Reserve commission as captain, Coast Artillery Corps.

✓ ✓ ✓

CAPTAIN JOSEPH I. GREENE, Infantry, a long-time contributor to *The Journal*, is on duty in the National Guard Bureau.

✓ ✓ ✓

MAJOR S. L. MCCROSKEY, Coast Artillery Corps, is a native of the State of Washington. After graduating from Washington State College in 1916 with the degree of A.B. he entered the army as a second lieutenant, CA-ORC, in August, 1917. Appointed a second lieutenant, Coast Artillery, regular army in October, 1917, he has served in that branch since that time. Major McCroskey is a graduate of the Coast Artillery School Battery Officers' Course (1925) and the Command and General Staff School (1936). He is now on duty in the matériel and finance section, office of the Chief of Coast Artillery.

✓ ✓ ✓

CAPTAIN L. E. C. M. PEROWNE, Royal Engineers, British Army, was born in London. A graduate of Wellington College, he entered the Royal Military Academy at Woolwich in 1921, to win his commission as second lieutenant, Royal Engineers, in 1923. In 1925, he was posted to the 1st AA Searchlight Battalion, Royal Engineers and served with that organization until 1929, with the exception of a few months spent with the British Army of the Rhine. Promoted to captain in 1934, he then served as an engineer on the new construction at Singapore until 1936. At the moment Captain Perowne is an instructor in searchlights with the 2d AA Division, Territorial Army. He is the 1930 winner of the Montgomerie Prize for the best contribution of the year to the *Royal Engineers Journal* with an article entitled "Some Problems in Air Defence."

✓ ✓ ✓

LIEUTENANT JACK W. RUDOLPH, Infantry, has the job of keeping *JOURNAL* readers alert to doings in the Orient. You will recall his "Thunder in the East" (July-August, 1938) which brought the war in Asia down to the fall of Suchow. His current offering—"The Long Road to Hankow"—ends, appropriately enough, with the fall of the second Chinese capital. A graduate of the Military Academy class of '33, Lieutenant Rudolph is now on duty with the 17th Infantry, Fort Leavenworth.

Coast Artillery Orders

(Covering the Period September 1 to October 31, 1938)

Colonel E. E. Bennett, from 62d, Ft. Totten, to 3d C.A. Dist., Ft. Monroe.

Colonel L. C. Brinton, Jr., retired, September 30.

Colonel G. W. Cocheu, retired, Nov. 30.

Colonel J. H. Cunningham, from the Philippines, to 14th, Ft. Worden. Previous orders revoked.

Colonel F. P. Hardaway, from Hawaii, to 2d, Ft. Monroe. Previous orders amended.

Colonel C. B. Meyer, from Panama, to Organized Reserves, 1st Corps Area, Portland, Maine.

Colonel W. R. Nichols, from 3d C.A. Dist., Ft. Monroe, to Panama, sailing New York, December 21.

Colonel Willis Shippam, from Organized Reserves, 9th Corps Area, Presidio of San Francisco, to the Philippines, sailing San Francisco, Feb. 28.

Colonel E. A. Stockton, Jr., from Panama, to 63d, Ft. MacArthur.

Colonel T. A. Terry, from the Philippines, to 6th, Ft. Winfield Scott.

Lieutenant Colonel H. H. Acheson, retired, October 31.

Lieutenant Colonel W. M. Chapin, from instructor, Maine N.G., Portland, to Panama, sailing New York, March 1.

Lieutenant Colonel W. D. Frazer promoted Colonel October 1.

Lieutenant Colonel F. P. Hardaway promoted Colonel October 1.

Lieutenant Colonel W. C. Koenig promoted Colonel September 1.

Lieutenant Colonel J. B. Martin, from recruiting, Peoria, Ill., to the Philippines, sailing New York, Feb. 7.

Lieutenant Colonel G. F. Moore promoted Colonel October 1.

Lieutenant Colonel E. P. Noyes promoted Colonel October 1.

Lieutenant Colonel F. A. Price promoted Colonel October 1.

Lieutenant Colonel Willis Shippam promoted Colonel October 1.

Lieutenant Colonel A. G. Strong, from General Staff with troops, First Army Staff, Boston, to office Chief of Coast Artillery.

Lieutenant Colonel R. L. Tilton promoted Colonel October 1.

Lieutenant Colonel A. H. Warren, from the Philippines, to Organized Reserves, 9th Corps Area, San Francisco.

Major T. J. Betts, from Office Chief of Coast Artillery to War Department General Staff, Oct. 15.

Major E. G. Cowen, from 7th, Ft. Hancock to University of New Hampshire, Durham.

Major A. D. Chipman promoted Lieutenant Colonel October 1.

Major C. S. Denny, Finance Dept., from 2d Corps Area, Governors Island, to Ft. Jay.

Major W. M. Goodman promoted Lieutenant Colonel October 1.

Major L. Y. Hartman, from 14th, Ft. Worden, to Organized Reserves, 9th Corps Area, Los Angeles.

Major D. D. Himman promoted Lieutenant Colonel October 1.

Major R. J. Imperatori, from Panama, to 7th, Ft. Hancock.

Major R. C. Jones, from 6th, Ft. Winfield Scott, to Reno High School, Reno, Nevada.

Major Kenneth McCarty promoted Lieutenant Colonel October 1.

Major W. F. Putnam, Jr., from 52d, Ft. Hancock, to 13th, Key West Barracks.

Major G. B. Robison promoted Lieutenant Colonel September 1.

Major R. E. Turley, Jr. promoted Lieutenant Colonel October 1.

Major R. J. VanBuskirk, from Organized Reserves, 1st Corps Area, Portland, Maine, to Hawaii, sailing New York, Nov. 15.

Major S. E. Wolfe promoted Lieutenant Colonel September 2.

Major Ellsworth Young, from 52d, Ft. Hancock, to instructor, R.I.N.G., Providence.

Captain A. D. Amoroso, from 63d, Ft. MacArthur, to the Philippines, sailing San Francisco, February 28.

Captain G. B. Anderson, from Panama, to USAMP *General J. Franklin Bell*, Ft. Worden.

Captain A. S. Baron, from 52d, Ft. Story, to Panama, sailing New York, Dec. 21.

Captain C. McK. Conzelman, from 13th, Ft. Barrancas, to the Philippines, sailing New York, February 7.

Captain C. H. Crim, from the Philippines, to 69th, Ft. Crockett.

Captain W. G. Devens, from University of New Hampshire, Durham, to U.S.M.A., West Point.

Captain C. W. Gettys, from 62d, Ft. Totten to Panama, sailing New York, March 1.

Captain W. R. Goodrich promoted Major October 1.

Captain A. L. Haggart promoted Major October 1.

Captain F. A. Hollingshead promoted Major October 1.

Captain J. W. Huyssoon, Organized Reserves, 3d Corps Area, in addition to his other duties in Washington, D. C.

Captain W. L. Johnson, from 13th, Key West Barracks, to Panama, sailing Charleston, S. C., March 3.

Captain L. S. Kirkpatrick, to the Philippines, sailing New York, February 7. Previous orders amended.

Captain C. W. McGeehan, from Panama, to 52d, Ft. Hancock.

Captain J. D. Moss, from Ft. Hayes, to 4th Corps Area, Atlanta.

Captain W. C. Rutter, from Panama, to 52d, Ft. Monroe.

Captain H. W. Smith, from 69th, Ft. Crockett, to the Philippines, sailing San Francisco, February 28.

Captain J. H. Smith to retire, December 31.

Captain L. S. Smith, transferred to Adjutant General's Department.

Captain G. A. Tucker, from the Philippines, to 3d, Ft. MacArthur.

Captain V. W. Wortman promoted Major October 1.

Captain G. E. Young, from the Philippines, to 65th, Ft. Winfield Scott.

First Lieutenant G. N. Adams, from 51st, Ft. Monroe, to the Philippines, sailing New York, February 7.

First Lieutenant R. L. Anderson, from the Philippines, to 61st, Ft. Sheridan.

First Lieutenant Alfred Ashman, from the Philippines, to 2d, Ft. Monroe.

First Lieutenant W. H. Baynes, from the Philippines, to 2d, Ft. Monroe.

First Lieutenant C. J. Bondley, Jr., from student, Air Corps Advanced Flying School, Kelly Field, to Air Corps, Langley Field.

First Lieutenant S. W. Foote, from Panama, to 52d, Ft. Monroe.

First Lieutenant T. A. Glass, transferred to Corps of Engineers, October 12.

First Lieutenant H. R. Hale, from the Philippines, to 51st, Ft. Monroe.

First Lieutenant C. W. Hill, from the Philippines, to 51st, Ft. Monroe.

First Lieutenant G. E. Keeler, Jr., from the Philippines, to 2d, Ft. Monroe.

First Lieutenant T. K. MacNair, from 2d, Ft. Monroe, to the Philippines, sailing New York, February 7.

First Lieutenant R. M. Miner, from the Philippines, to 51st, Ft. Monroe.

First Lieutenant R. A. Pillivant, from Hawaii, to Ord. Dept., Springfield Armory, Springfield. Previous orders revoked.

First Lieutenant W. G. Root, from Air Corps Training Center, Randolph Field, to 2d, Ft. Monroe.

First Lieutenant N. A. Skinrood, from the Philippines, to 52d, Ft. Monroe.

First Lieutenant B. S. Waterman, from the Philippines, to 52d, Ft. Monroe.

Second Lieutenant A. A. Abston, from 2d, Ft. Monroe, to the Philippines, sailing New York, February 7.

Second Lieutenant L. C. Baldwin, from 51st, Ft. Monroe, to the Philippines, sailing New York, February 7.

Second Lieutenant J. S. Byrne, from 62d, Ft. Totten, to the Philippines, sailing New York, February 7.

Second Lieutenant A. D. Clark, from student, Air Corps Advanced Flying School, Kelly Field, to Air Corps, Langley Field.

Second Lieutenant W. C. Conway, from Air Corps Advanced Flying School, Kelly Field, to Hawaii, sailing San Francisco, December 9.

Second Lieutenant C. A. Cozart, from the Philippines, to 52d, Ft. Monroe.

Second Lieutenant R. H. Hackford, from student, Air Corps Advanced Flying School, Kelly Field, to Air Corps, Hawaii, sailing San Francisco, Dec. 9.

Second Lieutenant H. H. Hauck, from 69th, Ft. Crockett, to the Philippines, sailing San Francisco, February 28.

Second Lieutenant R. H. Herman, from student, Air Corps Advanced Flying School, Kelly Field, to Air Corps, March Field.

Second Lieutenant C. R. Low, from Air Corps Advanced Flying School, Kelly Field, to Air Corps, March Field.

Second Lieutenant F. A. Miller, from 14th, Ft. Worden, to the Philippines, sailing San Francisco, February 28.

Second Lieutenant C. L. Robbins, from student, Air Corps Advanced Flying School, Kelly Field, to Air Corps, Hawaii, sailing San Francisco, December 9.

Second Lieutenant Alford Rutherford, from student, Air Corps Advanced Flying School, Kelly Field, to Air Corps, Hawaii, sailing San Francisco, December 9.

Second Lieutenant E. M. Shiley, from 2d, Ft. Monroe, to the Philippines, sailing New York, February 7.

Second Lieutenant Robert Taylor, 3d, from student, Air Corps Advanced Flying School, Kelly Field, to Air Corps, Hamilton Field.

Second Lieutenant J. D. Wood, from 52d, Ft. Monroe, to the Philippines, sailing New York, February 7.

Second Lieutenant W. J. Worcester, from 52d, Ft. Monroe, to Panama, sailing New York, revoked.

Book Reviews

FIGHTING FOOLS, by Brigadier General James E. Edmonds, NGUS. New York: D. Appleton-Century Company, 1938. 359 Pages. \$2.50.

"Let's be honest with ourselves," says the author as he starts out, and he then proceeds to do it. Those people who smugly consider our national career a pacific one, he blasts out of their complacency with the statement, "The truth is we've been truculent, boastful, touchy, land-grabbing people—peculiarly gifted with the talent for persuading ourselves that we are somehow entitled, as by Providence, to take anything in sight no matter to whom else it belonged, which we believed we could put to better advantage in the service of what we dubbed 'our type of civilization'; . . . We've always been right."

The author then proceeds to prove his case up to the hilt. Step by step he takes up our history and shows us up for the greedy land-grabbers that we were. True, he believes we have about what we need now and appear content. But in the reviewer's mind that is questionable. Let something appear that we might covet and the grasping arm will again reach out. The Panama episode happened only yesterday, it should be remembered.

For the military men the author has done a splendid service. They do not make the war—nor want it, for that matter. It is the nation as a whole that makes the war and then turns it over to the soldier to fight. The tale is not a pretty one. An insufficient army takes over a big task, supported by raw militia and urged on by political directors. Chaos exists, battles are lost, blunders are made, opportunities are missed, nothing is right. As the war progresses an army must be built. Eventually the army evolves and the war is brought to an end—generally a successful one. To the one who reads his history carefully this is an astounding fact.

The United States, in the author's opinion, neglects its army, and its navy, has always kept its military strength perilously low, and never prepares for the possibility of war, while at the same time it conducts its foreign affairs with a thinly veiled truculence very likely to lead to war. From the world of political affairs he shows how often we have nonchalantly, carelessly—have it how you will—walked into situations that rightfully should lead to war—but did not. We waged many wars but, somehow, blindly escaped as many more. He shows that the nation quite readily and even enthusiastically would follow a president who flatly challenged a great power, and do this without the whipping up of public opinion by any munitions makers. It is these Machiavellian munitions men that the intellectuals and liberals berate for pushing us into the World War, so silly they are.

He ends his tale by a discussion of our present military situation—the National Guard, the Reserves, the Regular Army, and even the CCC. He sketches it all in against the background of the present-day world. One may not agree wholly with the author, but he certainly has given food for thought.

Above all, the author has a clear picture of the American; how he is moved and how he thinks. As he says, "The Americans, whatever their varying antecedents, remained singularly opposed to being told what to do—and what not. They have not become, at heart, either gentle or long suffering." Certain people might keep that in mind.

Here is a book that is realistically written. It is written by a man who knows his subject and how to weave the military policy of our country and the country's general political policy into a complete fabric. And then picturing the world he shows how we are rightfully entitled to the name *Fighting Fools*. We can take a certain pride in the first part of the title but he proves that our record shows that we are more fully entitled to the latter portion.

A book well worth reading by all who are not wishful thinkers.

S. O.



NAPOLEON: SOLDIER AND EMPEROR. By Octave Aubry. Philadelphia: J. B. Lippincott Company, 1938. 454 pages; 25 illustrations; index. \$3.75.

To review a book on Napoleon is like reviewing a Shakespearean play; anything that can be said has been said before, a dozen times over. Nevertheless, Octave Aubry has drawn a singularly clear picture of events surrounding the First Empire; and there may be a deeper motive behind this publication than appears in the title. With military dictators running rampant over Europe, every bit of eighteenth-century intrigue can find its exact counterpart on the international stage of today. The props and scenery are the same: only the actors and their parts have changed.

Then as now, political boundaries disappeared over night: the strong preyed upon the weak and treaties were not worth the paper they were written on. Also, it was Napoleon who stated that God was on the side with the most guns. How little the world (or rather man) has changed in over a hundred years!

Perhaps Octave Aubry is right in producing a work which reminds us that wherever there exists an oppressed people, there also will spring up a leader under the guise of liberator. And once such a leader tastes power, he will proceed, in the natural course of events, to becoming a

I DON'T CARE A WHOP HOW YOU DID IT
SOME PLACE ELSE! FROM NOW ON
YOU'LL DO IT ACCORDING TO THE I.D.R.



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conqueror. Let us hope, since the British navy can no longer control a man like Napoleon, that there always will be similar characters to those in Aubry's book: namely, the villain Talleyrand to lead the conqueror astray, and the rogue Fouché to betray him. After all, a dictator can last only just so long—even though his name goes on forever.

Certainly the name Napoleon is something to conjure with, even today. And if you haven't a book devoted to the Little Corporal, this is as good a time as any to get one. Furthermore, this particular volume has an index for ready reference which will greatly facilitate the finding of many apt predictions, applicable to present day events.

E. D. C.

A HISTORY OF MEXICO, by Henry Bamford Parkes.
Boston: Houghton, Mifflin Company, 1938. 432 Pages;
Illustrated. \$3.75.

To the south lies Mexico. Though it is adjacent, its history has been consistently neglected. That its history is turbulent we know; why it should be so most people have only a shadowy idea. Henry Bamford Parkes packs within the compass of his book a connected logical story of this misunderstood country. Perhaps he leans rather heavily on the economic interpretation of history, but, on the whole, he seems justified.

Long before the coming of the white man the Indians of Mexico had built up a substantial civilization, with great cities and a large population. Why Mayan civilization declined it is hard to say. No one knows exactly, but the jungles of Yucatan are studded with their stone cities. To the north the Aztecs secured the hegemony of the country and their capital city of Tenochtitlán governed a vast empire. It was a city of stone set in a lake, magnificent, beautiful. The stone houses were trimmed with woodwork of delicately carved cedar, and surrounded with orchards, rose gardens, and fish ponds. From the shores of the lake a causeway of stone led five miles to Tenochtitlán and the pyramids of the bloody god Huitzilopochtli. When first viewed by the Spaniards it all seemed like a dream. Later, on the ruins of all this beauty—the shards of its stonework and its idols—rose the city which today is called Mexico.

It is true these Indians were bloodthirsty and their religion was pervaded with revolting cruelty. But in some respects these people were superior to their conquerors. For one thing, their calendar was more accurate than the one the white man brought with him.

But they were no match for the cunning, dynamic, and courageous Cortéz with his modern weapons and terrifying horsemen. Nothing stood in his way for long. Eventually he conquered the country. Spaniards came in to govern and the Indians lapsed into slavery or peonage. Their civilization was destroyed but—and this is important—the people were not. The white man farther to the north ruthlessly uprooted or destroyed the Indians until he reached the Pacific. But in Mexico the Indians remained in large masses, the passive tools of their conquerors. And

that set the stage for centuries of unrest and revolution.

A few Europeans strained the richness of the country through their fingers. Little was left for the native. A creole class, descendants of the Europeans, and a *mestizo* class soon formed and struggled for a place in the sun. Political disturbance was the order of the day, but the economic unbalance of the country was never corrected. Later the creoles seized the political power from Spain, but the *mestizos* and natives were moving up. There were wars and we hear of Hidalgo, Iturbide, and Santa Ana. The giant republic to the north tore away the whole northern part of the country. Then Juárez—a full-blooded Indian—came into power and more wars were waged. Then the French put the puppet Emperor Maximilian on the throne. More wars. Maximilian died by musketry before an adobe wall and the wars continued flickering. Finally, Porfirio Díaz, a Mixtlan Indian with a dash of white blood, came to power as a dictator. Order was established and foreign capital flowed in. As the author sees it, the capitalist was enriching himself at the expense of the Mexicans.

All during these hundreds of years the Indian was moving slowly into his own. When Díaz fell, the series of wars which followed put the Mexican Indian firmly into power. With this power he started to revamp conditions to give the Indians their economic rights even if foreign or other capitalists must be displaced.

So today we have a unique country south of the Rio Grande. Here is no people stemming from Europe, but a people in every essence native, a people who have taken a Latin culture and an Indian heritage and blended them to evolve a typical Mexican culture. The native is in power. He is no dullard. He is well worth knowing. To one who has been below the Rio Grande the thesis of the author is not difficult to accept.

There is more in Mexico than was ever brought there by the Spanish grandees. We should be looking into it.

S. H. O'B.

↑ ↑ ↑

VETERANS' BENEFITS. Compiled by the Veterans' Administration. Washington: The Superintendent of Documents. 56 pages; 10c.

This pamphlet tells in a general way the different benefits that accrue to persons who have served in the armed forces of the United States in peace or war. It also outlines the rights of dependents and the requirements that must be met by various claimants.

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INSTRUCTIONS AND INFORMATION

1. The ballot below is the slate prepared by a nominating committee to replace those members whose terms of office expire on December 31, 1938.
2. Record your vote by making an "X" in the appropriate square or indicate your choice by writing in the name of your candidate. Ballots received with signature, but without individual votes recorded, will be considered proxies.
3. No member is to be deprived of a voice in the nomination and selection of the new members of the Council. If you do not approve of the Committee's choice, enter your personal choice in the space provided.
4. Ballots received after January 4, 1939, will not be counted.
5. If residing on a military post, please hand your ballot to the Adjutant to be forwarded together with all other ballots collected on the post. Members of National Guard and Organized Reserve Regiments should turn in their ballots to their regimental headquarters to be forwarded at one time. Those members for whom the foregoing instructions are not applicable should mail their ballots to The Secretary, U. S. Coast Artillery Association, 1115 17th St., N.W., Washington, D. C.

THE U. S. COAST ARTILLERY ASSOCIATION BALLOT

FOR ADDITIONAL MEMBERS OF THE EXECUTIVE COUNCIL (1939-40)

Please vote for three *only*; one regular army, one national guard and one reserve officer

- Colonel Howard K. Loughry, C.A.C.
- Colonel F. S. Clark, C.A.C.
- Lt. Col. E. B. Colladay, C.A.C.
- Major T. J. Betts, C.A.C.
- Colonel W. W. Burns, D.C. N.G.
- Colonel E. E. Gauche, N.Y. N.G.
- Colonel C. C. Dawes, Ill. N.G.
- Brig. Gen. R. E. Mittelstaedt, Cal. N.G.
- Colonel J. B. Bentley, CA-Res.
- Colonel Milo Brinkley, CA-Res.

Fill in names of other candidates you desire to vote for in lieu of those above.

-
-

.....
Signature

.....
Rank and Organization

.....
Address

THE MEN I KILLED, by Brigadier General Frank Percy Crozier, British Army. New York: Doubleday, Doran & Company, Inc., 1938. 269 Pages. \$2.00.

Here is a revealing book. It was written by a man who had been through the whole show and who talks frankly, even brutally, of the war as he saw it. Lloyd George is anathema to many English soldiers because he speaks with the same frankness of the crass stupidity—as he sees it—of the British high command. Yet General Crozier bears him out.

What can one say of the positive order that "commanding officers were not to accompany their units in the advance or even deploy them in No Man's Land . . . they were to take to their dugouts so as to be 'safe'." It should be axiomatic that any attack that is not worth risking a battalion commander's life is not worth staging, and if staged, is not likely to succeed. Again, what can one think of the plan of the higher command that brought battalions in column of fours within enemy trench-mortar range and did this against the wishes of the front-line commanders? In one case what happened was that the German trench mortars completely destroyed the first two companies of one battalion.

There is much data in this book that will go to support the broad generalization of Lloyd George and his general indictment of the British high command. When history in coming times writes the story of the World War with cold objectivity, it is likely that the judgment of General Crozier and Lloyd George will be found to come close to the ultimate truth. That is, if one can get such precise truth from the mêlée of war.

Did Crozier kill men? Yes, he did, and he tells his tale frankly. He shot down one of his own officers flying for his life to the rear as well as the German bayonet man that pursued him. He was handy with his pistol.

There was a volcanic drive to this man. He allowed nothing to stand in his way in war. But with all this there was another side, and one hard to analyze. He believes, despite his harshness, his cold ferocity in battle, that war was wrong and could and should be avoided. How this was to be effected is not clearly indicated. This one extract, however, may explain him: "The moment England lifts a finger to defend herself by force her day is done."

Undoubtedly it was his ruthless determination in the war that led to the British government giving him, after the war, the command of the "Black and Tan" force in rebellious Ireland. It was not a pretty job, and it sickened him. He found that his pious political superiors were expecting him to slaughter, wholesale or retail, and had a very excellent system which enabled this to be done with neatness and dispatch. The law courts functioned as His Majesty's Government wished. Crozier, a strong man and a clean soldier, resigned in disgust; and while he does not say so, undoubtedly ruined forever any chance he may have had for advancement in the British Army. The "pink coated" crowd that forms the English oligarchy were against him.

The blurb on the cover warns that this book "will make

militarists apoplectic." Perhaps so. But here stands one military officer that found it interesting and thought-provoking, even though he found many points of disagreement. To be sure, it is hard to arrive at any clear-cut decision regarding Crozier as a man and a soldier, for it is hard to analyze his mentality. But this is significant: Crozier's preaching of peace for England at any cost seems to have anticipated Prime Minister Chamberlain's dramatic October stand in the political world. S. O.

♦ ♦ ♦

WALLENSTEIN: SOLDIER UNDER SATURN. By Francis Watson. New York: D. Appleton-Century Company, 1938. 439 Pages; Illustrated; Maps; Index. \$3.50.

A life of Wallenstein is an appropriate book for this particular day and time. For Albrecht von Wallenstein, had he lived today, would probably have been classed as a Sudeten German. Indeed, he was born in a village that nestled high up among that very strip of mountains, along the north frontier of Bohemia, which has so recently had prominence in the headlines. Very likely, too, had Wallenstein been living these few weeks past, he would have played as big a rôle as any in settling the fate of Europe.

Wallenstein is one of those figures of history whose career, flashing upward from nothing and nowhere, gives endless embarrassment to historians who would deny that great men arise sometimes by accident to change the story of the world. But even Mr. Watson in his carefully written biography cannot explain in full this star-gazing prince and general who came from a humble if noble home, and who by early middle age was dealing with kings and emperors as an equal.

For seventeen years Wallenstein was a colonel. He was a good one, and in the later years of this period often did a general's work. In these same years he grew in wealth, acquiring through marriage and purchase larger and larger estates not many miles northeast of Prague. He was still a colonel by the time he had risen to the title of a minor prince. His fighting had all been done as a member of the Catholic armies that supported Ferdinand, the Emperor of the Holy Roman Empire.

But in 1625, when Wallenstein was 42, the Emperor suddenly needed a new army. He had armies in the field already, one of them under the famous Tilly. But he needed another to meet a new threat from a new direction.

Wallenstein went to the Emperor and offered to raise 50,000 men at no expense to the Emperor himself. This was so astounding an offer from so unexpected a source that the Emperor and those around him were afraid to accept. An army of 50,000 was too powerful a force to let grow in the hands of a comparative upstart. The Emperor and his advisers said that 12,000 was enough. But Wallenstein held to his first offer. Finally, the Emperor made Wallenstein's principality into the Duchy of Friedland to give him suitable rank, and told him to raise his army.

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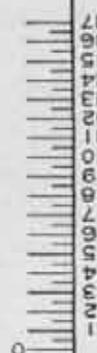
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But Wallenstein was more than a first-rate military leader. He carried in his heart the ideal of a united Germanic peoples, not perhaps in the modern sense, but in the sense of a great empire with Catholic kingdom and Protestant duchy united in peace and prosperity under a single great Catholic Emperor. Whether Wallenstein dreamed of himself in that place, we do not know for certain; but in the words of Mr. Watson, "Power was his aim . . . it is hard to say where Wallenstein's dreams of imposing himself upon the history of his time stopped short."
G. V.

THE MOUNTAINS AND THE STARS. By Valentin Tikonov. Boston: Little, Brown and Company, 1938. 426 pages, \$2.50.

Like most books with a Russian background, it would take a Slavic mind to fully appreciate the high spots in this historic novel. However, there is plenty of blood and thunder for anyone to understand.

Starting from somewhere on the Ingoda River (wherever that may be), the author takes little Mishka and Petka away from their widowed mother for a sanguinary tour of the Siberian—Outer Mongolian border. Both boys join the East Asiatic Cossack Division in the hopes of getting something to eat and also of fighting the Reds. The lads get plenty of action and so does the reader. There are long marches, fierce battles, and bitter punishments; all under the despotism of Baron Ungern-Sternberg, leader of the White Cossacks. The Baron proves to be so brutal a disciplinarian that one wonders how long he can maintain control over even so simple a people as the illiterate peasants in his command. He does so only as long as he is victorious: once defeat and the Bolsheviks drive the Asiatic Division back whence it came, Ungern is destroyed by his own men.

The Cossacks, as a symbol of emancipation, then invade their own field hospital and ravish the nurses. Following which the White army, under new leadership, aimlessly wanders off under the delusion of having attained freedom. The book closes with Mishka tearfully searching for little Petka who apparently has taken up his permanent abode with the ravished nurses. The fate of the boys' mother, back on the Ingoda River, is left in obscurity.

The reader also finds himself a little uncertain as to just where he has been and what he has learned. Perhaps this is because the author has chosen to write from an over-the-shoulder viewpoint of peasant soldiers. However, two thoughts protrude themselves beyond the entertaining narrative itself, namely: Brutality can easily sustain itself on the sturdy legs of victory, but brings quick retaliation in defeat. Also, the Asiatic temperament of Siberian Russians is beyond the ken of an Anglo-Saxon. Further than that, this reviewer refuses to venture—except *The Mountains and the Stars* is not for children. E. D. C.

BUILDING THE BRITISH EMPIRE (To the End of the First Empire). By James Truslow Adams. New York: Charles Scribner's Sons, 1938. 438 pages; index. \$3.50.

This new work of Major Adams, who is well known for his writings on American history, is not as workman-like a job as the books he has done before. For several years a resident of England, and long a man with admiration for the English and their remarkable story, Major Adams has been impelled to write a popular history of them. But he seems to have dashed off his first volume in something of a hurry, for it contains many passages rough from hasty writing which make for uneasy reading.

At the same time, Major Adams is fair in his judgments—he is not a marked Anglophile—and he is modern in his background. His is distinctly not a popular rehash of John Richard Green's famous history. Indeed, reading Major Adams's new book is a good and not particularly hard way of reviewing English history, and you need to review it if you are harking back more than ten or fifteen years to the last history of England you read or studied. Research of the past two decades has brought surprising changes into the old story, particularly of the Saxon centuries before the coming of the Conqueror.

Major Adams's history is also recommended to those who may be wondering how abrupt a turning point the British Empire is just now reaching. This book, and a second volume yet to come, will do very nicely to show what storms the British Empire weathered in its building, and give a fair basis for a guess upon the aftermath of the present hurricane.

G. V.

MARLBOROUGH: HIS LIFE AND TIMES, Vol. VI (1708-1722) by Winston S. Churchill. New York: Charles Scribner's Sons: 1938. 670 pages; illustrated; \$2.75.

This is the final volume of Churchill's massive biography of the Duke of Marlborough. The narrative begins in autumn 1708 with a situation highly favorable to the Allies and critical for France under Louis XIV. Yet a peace favorable to the Allies was not immediately achieved. Complex political quarrels followed; costly sieges and one terribly bloody battle remained to be fought before the brilliant English commander left France and Belgium. With a written style that keeps pace with the bold strides of his hero, Churchill shows how the power of France recovered as the influence of Marlborough declined.

The chapters on Malplaquet, the only large-scale victory of this period, are well executed. This was Marlborough's most costly victory, and Churchill shows how he wrung a victory out of the confusion and discouragements which the engagement of the morning and early afternoon had produced. The most effective use of an original document in reproduction is a facsimile of Marlborough's letter to Sarah begun before Malplaquet and finished after that terrible battle, Marlborough's hand-

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Speaking of the pusillanimous policy which England soon adopted after this battle Churchill said: "The British army was forced to abandon its comrades in the field, and a peace was made contrary to every canon of international good faith. All Europe, friend and foe, was staggered by the perfidy of the Tory Ministers.—The name of England became a bye-word on the Continent." It is not surprising that some sharp-eyed observers have pointed out that Churchill might conceivably have been speaking of the events of the summer of 1938.

Churchill makes his strongest case against the vindictive Tory opponents of Marlborough such as Harley, Swift, St. John, and the Queen. In this as in all the volumes of this series, Churchill shows that while Marlborough was not a plaster saint; he was the outstanding man of his age, a soldier of the very first rank, a skillful diplomat, and a patriotic Englishman. In a period of short biographies Churchill's six volume opus seems certain to rank with the truly great biographies of all time.

H. A. D.

THE RAMPARTS WE WATCH. By George Fielding Eliot. New York: Reynal and Hitchcock, 1938. 370 pages; illustrated; \$3.00.

Even the name of this well written book has a peculiar appeal to the Coast Artilleryman who spends long hours in watching over the ramparts. His watch may be a limited one, but the author has taken a very broad view of our national defense and he closes after 354 pages of forceful logic, with the phrase "the seas which are our ramparts, and upon which we must stand our watch." This wording indicates the tenor of the book, the plea for a strong navy backed by an army proportionately smaller but organized to fit our peculiar needs.

I have no desire to paint the lily and of such I might be accused if I made an attempt at a laudatory review of this book, following such reviews of it as have come to my notice in the *New York Times*, the Washington daily papers and *Time*. Suffice to say that the author includes some paragraphs very comforting to a Coast Artilleryman.

You should read it.

A. H. S.

NOTES ON FRENCH ORDNANCE, 1717 to 1936, by Captain James E. Hicks, assisted by Andre Jandot. Published by the author, Mount Vernon, New York, 1938. 287 pages; illustrated; index; \$3.50.

This exhaustive and comprehensive work on French ordnance really deserves the adjective "superlative." Over two centuries of development in French weapons—covering everything from muskets to tanks—are presented in clear, concise, and readable fashion. Moreover, the book is lavishly illustrated.

Captain Hicks' book is bound to prove an invaluable source of information to all officers. As a matter of fact, no student of ordnance can call his library complete without it.

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